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Bibliography on Soil Moisture

March 1959

No. 3

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY is a monthly publication devoted to:

- A. Current Abstracts in English on important meteorological literature in every language.
- B. Bibliographic references to other items of interest to the profession.
- C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 10

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No. 3



SPECIAL FEATURE IN THIS ISSUE

Bibliography on Soil Moisture

By
Geza Thuronyi

(For complete table of contents see back cover)

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LIST OF PERIODICALS

Note: This list contains the titles of the periodicals which regularly contain material on meteorology or related fields and it comprises only a small percentage of the periodicals from which pertinent articles are abstracted. The form of serial entry adopted by MAB is given in bold face type below.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

- ★Acta Geophysica Polonica, [Warsaw].
- Akademiia Nauk SSSR, Izvestiia, Ser. Geogr. and Ser. Geofiz., [Moscow].
- American Geophysical Union, Transactions, [Washington].
- ★American Meteorological Society, Bulletin, [Boston].
- ★Angewandte Meteorologie, [Potsdam].
- Annales de Géophysique, Centre National de la Recherche Scientifique, [Paris].
- ★Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B, [Vienna].
- Australian Journal of Physics, [Melbourne].
- ★Australian Meteorological Magazine, [Melbourne].
- ★Ciel et Terre, Société Belge d'Astronomie, Météorologie et Physique du Globe, [Brussels].
- ★Geofisica e Meteorologia, Società Italiana di Geofisica, [Genoa].
- Geofisica Pura e Applicata, Istituto Geofisico Italiano, [Milan].
- ★Geophysical Magazine, Japan Meteorological Agency, [Tokyo].
- Hemel en Dampkring, [The Hague].
- ★Időjárás, Magyar Meteorológiai Társaság and Országos Meteorológiai Intézet, [Budapest]
- ★Indian Journal of Meteorology and Geophysics, [Delhi].
- ★Journal of Atmospheric and Terrestrial Physics, [London].
- Journal of Geophysical Research, [Washington].
- ★Journal of Meteorological Research, [Tokyo].
- ★Journal of Meteorology, American Meteorological Society, [Boston].
- ★Journal Scientifique de la Météorologie, Société Météorologique de France, [Paris].
- ★The Marine Observer, Air Ministry, Meteorological Office, London.
- ★The Meteorological Magazine, Air Ministry, Meteorological Office, London.
- ★Meteorologické Zprávy [Prague].
- ★Meteorological Society of Japan, Journal, [Tokyo].
- ★La Météorologie, Société Météorologique de France, [Paris].
- ★Meteorologiia i Gidrologiia, [Leningrad].
- ★Meteorologische Rundschau, [Berlin].
- ★Monthly Weather Review, U. S. Weather Bureau, Washington, D. C.
- Polarforschung, Archiv für Polarforschung, [Kiel].
- ★Przegląd Geofizyczny, [Warsaw].
- Revista de Geofísica, Instituto Nacional de Geofísica, [Madrid].
- ★Rivista di Meteorologia Aeronautica, Servizio Meteorologico, [Rome].
- ★Royal Meteorological Society, Quarterly Journal, [London].
- ★South Africa, Weather Bureau, Notos, [Pretoria].
- ★Tellus, Svenska Geofysiska Föreningen, Stockholm.
- Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Leningrad].
- ★Weather, Royal Meteorological Society, [London].
- ★Weatherwise, American Meteorological Society, [Boston].
- ★Wetter und Leben, Österreichische Gesellschaft für Meteorologie, [Vienna].
- ★WMO Bulletin, World Meteorological Organization, [Geneva].
- ★Zeitschrift für Meteorologie, Meteorologisches Observatorium, Potsdam.

★ Indicates those periodicals which are primarily meteorological.

FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically).

Bibliographies published in the successive issues were:

Vol. I, 1950

- | | | | |
|---------------------|-------------------------|--------------------|------------------|
| 1. Atmos. Pollution | 2. Aerobiology | 3. Cloud Physics | 4. Hail |
| 5. Tornadoes | 6. Volcanic Dust | 7. Climat. Changes | 8. Thunderstorms |
| 9. Icing | 10. Acoust. Propagation | 11. Evaporation | |

Vol. II, 1951

- | | | | |
|------------------------|---------------------------|-------------------|--------------------|
| 1. Extended Forecast. | 2. Long Range Forecast. | 3. Soil Temp. | 4. Constants, etc. |
| 5. Clim. of Near East | 6. Clim. of Middle East | 7. Special Winds | 8. Radar Storm |
| 9. Condensation Trails | 10. Clim. of N. E. Africa | 11. Mountain Met. | Detect. |

Vol. III, 1952

- | | | | |
|--------------------------|----------------------|-----------------------------|-----------------------|
| 1. Clim. of N. W. Africa | 2. Carbon Dioxide | 3. Clim. of Argentina, etc. | 4. Dew |
| 5. Objective Forecast. | 6. Stratus Forecast. | 7. Urban Climatology | 8. Clim. of C. Africa |
| 9. Visibility | 10. Glaze and Rime | 11. Free Air Turbulence | |

Vol. IV, 1953

- | | | | |
|----------------------|--------------------------|---------------|-----------------------------|
| 1. Turbulence Theory | 2. Turbulent Diffusion | 3. Frost | 4. Clim. of Australia, etc. |
| 5. High Level Winds | 6. Winds in Stratosphere | 7. Jet Stream | 8. Radiation Bioclim. |
| 9. Clim. of Pacific | 10. Auroras | 11. Sferics | |

Vol. V, 1954

- | | | | |
|--------------------|------------------------|--------------------------|--------------------|
| 1. Oceanog. Met. | 2. Clim. of S. E. Asia | 3. Auroral Physics | 4. Tropopause |
| 5. Balloons | 6. Numerical Forecast. | 7. Radiation Data | 8. Vertical Motion |
| 9. Clim. of Arctic | 10. Industrial Met. | 11. Wind Waves and Swell | |

Vol. VI, 1955

- | | | |
|-------------------------|------------------------------|--------------------------|
| 1. Bibliog. of Bibliog. | 2. Texts & Monogr. Bibliogs. | 3. Storm Surges |
| 4. Ionospheric Prop. | 5. Photochem.—Upper Atmos. | 6. Cloud Physics |
| 7. Radar Cloud Physics | 8-9. Atmos. Nuclei | 10. Weather Modification |
| | | 11. Cooling Power |

Vol. VII, 1956

- | | | |
|--------------------------|-----------------------------|-------------------------|
| 1. Synoptic Met.-Arctic | 2. Clim. of Enclosed Spaces | 3. Cosmic Rays (-1952) |
| 4. Cosmic Rays (1953-56) | 5. Atmos. Radioactivity | 6. Inversions |
| 7. Snow Micromet. | 8. Snow Micromet. (Suppl.) | 9-11. Tropical Cyclones |

Vol. VIII, 1957

- | | | |
|----------------------------|--------------------------|---------------------------------|
| 1. Solar Weather Relations | 2. Night Airglow | 3. Forecasting Special Elements |
| 4. Forest Micrometeorology | 5. Hydromet. Forecasting | 6. Numerical Forecast. (Suppl.) |
| 7. Albedo | 8. Meteors | 9-10. Tropospheric Prop. |
| | | 11. Medical Meteorology |

Vol. IX, 1958

- | | | |
|-------------------------|-----------------------|--------------------------------|
| 1. Radioastronomy | 2. Solar Astrophysics | 3. Radioactivity in Atmosphere |
| 4. Waves and Currents | 5. Physical Oceanog. | 6. Dynamic & Phys. Oceanog. |
| 7. Long Range Forecast. | 8. Radar Met. | 9. Cosmic Rays |
| | | 10-11. Geomagnetism |

Vol. X, 1959

- | | | | |
|-----------------------------|------------------------|------------------|------------|
| 1. Works of C. E. P. Brooks | 2. Tornado forecasting | 3. Soil Moisture | 4. Sferics |
|-----------------------------|------------------------|------------------|------------|

Other bibliographies in preparation are:

<i>Actinometers</i>	<i>Micrometeorology</i>	<i>Singularities</i>
<i>Frost</i>	<i>Ozone</i>	<i>Synoptic Aerology</i>
<i>High Atmosphere Temperatures</i>	<i>Radiation</i>	<i>Thunderstorms</i>

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where the material may be found. The Union List of Serials (Gregory) is the source of most of the symbols used. In some cases, where no symbol has been assigned to a library, one will be devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.

Other symbols:

- * before an entry indicates a good data source.
- † before an entry indicates a good bibliography.
- § before an entry indicates a synoptic case history study accompanied by charts.

Geographic locations are in the English form rather than the form used locally, for example, Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwise stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months are abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Number (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus an entry will read as follows:

Meteorologische Rundschau, 2(5/6):146-151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, Jahrgang 2 (Vol. 2), Heft 5/6 (No. 5/6), pages 146-151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

10.3-1

523.16:551.521.64(08)

*†**Progress in Elementary Particle and Cosmic Ray Physics**, Vol. 1, pub. 1952. Vol. 4, pub. 1958. irregular. pub. by North-Holland Pub. Co., Amsterdam. Editor, John Graham Wilson, et al. Various contributions signed. Title varies: Vol. 1-3, **Progress in Cosmic Ray Physics**. figs., tables, bibliog throughout. Each vol. has an "author index" of works cited in the text, with page references. **DLC** (QC485.W49). Review by D. D. Miller in *Australian Journal of Science*, Sydney, 20(5):155, Dec. 1957.—These volumes give extensive and intensive information, data and illustrations on the theory and observation of cosmic ray phenomena in the laboratory and atmosphere. Each volume is an attempt to bring the student or researcher up to date (1951 in Vol. 1 and to 1957 in Vol. 4) on certain broad aspects of the subject. The main chapters of Vol. 1 are concerned with: (1) analysis of radiative and elastic collisions occurring in photographic emulsions; (2) decay of unstable cosmic ray particles; (3) coupling properties of nucleons, mesons and leptons; (4) the nature of the cosmic ray and its origin; (5) recent data on geomagnetic effects (theory of Störmer and others, cosmic rays in the atmosphere, data on geomagnetic effects, correlation of geomagnetic effects, energy distribution of primary radiation, gross behavior of cosmic rays in the atmosphere); (6) equilibrium of the cosmic ray beam in the atmosphere (primary component at the top of the atmosphere, underground, at sea level, the μ component, electron-photon component, N-component, π mesons, low energy events, extensive air showers and energy balance of cosmic ray beam); (7) observations underground—time and temperature coefficients, underground showers; (8) time variations of cosmic ray intensity (variations of atmospheric origin such as temperature and season, solar daily variation, sidereal daily variation and solar or geomagnetic variation). Chapter 3 of Vol. 2 (Published 1954) covers the penetrating component of cosmic rays in the upper atmosphere (latitude effects, depth curves between lat. 52° and 56° , the interpretation of intensity depth curves in low latitudes). Vol. 3 (419 p.) published in 1956 contains 4 chapters as follows: Greisen, K., **Extensive air showers** (p. 3-144); Budge, H. S., **Experimental results on charged K-mesons and hyperons** (p. 145-254); Thompson, R. W., **Decay processes of heavy unstable neutral particles** (p. 255-340); and Puppi, G. E., **Energy balance and cosmic radiation** (p. 341-386). Vol. 4 (pub. 1958) contains a chapter (4) by F. Singer entitled: **The primary cosmic radiation and its time variations** (p. 205-338) and Ch. 5 by V. L. Ginzburg, **On the origin of cosmic radiation** (p. 339-419). Each chapter has extensive lists of references, and authors and subjects indexes appear in each volume. *Subject heading*: 1. Cosmic ray physics. I. Wilson, John Graham (ed.).—M.R.

10.3-2

551.578.46(494)

*Davos, Switzerland. Eidgenössisches Institut für Schnee- und Lawinenforschung, **Schnee und Lawinen in den Schweizeralpen, Winter 1954/55**. [Snow and avalanches in the Swiss Alps, Winter 1954/1955.] Its *Winterbericht*, No. 19, 1956. 116 p. 44 figs., 50 tables, foot-
ings. Contents: Zingg, Th., **Meteorologie**, p. 5-27. Schild, M., **Schnee- und Lawinenverhältnisse im Schweizerischen Alpengebiet**, p. 28-69. Schild, M., **Durch Lawinen verursachte Unfälle und Schäden**, p. 70-84. In der Gand, H. R., **Spezielle Schnee- und Lawinenuntersuchungen im Parsenngebiet**, p. 85-101. de Quervain, M., **Versuchsverbauung Dorfberg/Davos**, p. 102-114. **Hinweise auf weitere im Winter 1954/55 durchgeführte Untersuchungen und Arbeiten**, p. 115-116. **DWB, DLC**—ZINGG characterizes the weather situations for each month, discusses solar radiation, temperature, wind, cloudiness, precipitation and gives detailed

weather data. SCHILD shows graphically the change in snow height and water value, gives numerous profiles with *ram*-values and presents detailed tables of snow conditions with avalanche information. Then he proceeds with an account of accidents and damages. IN DER GAND compares snow profiles with weather data on a genetic basis and attempts to give explanations for individual avalanche cases. DE QUERVAIN shows a number of simple protective avalanche structures and discusses measurement techniques. (For earlier reports, see 5.5-2, Feb. 1954 and 6.11-4, Nov. 1955, *MAB*.) *Subject Headings:* 1. Avalanches 2. Observational data 3. Snow research 4. Weissfluhjoch, Switzerland.—A.A.

TEXTBOOKS AND TECHNICAL BOOKS

See also: **Convection in fluids** (Ostroumov), 10.3-24; **Tropical architecture** (Fry, Drew), 10.3-92; **Soil moisture conservation** (Bitiukov et al.), 10C-5; **Soil moisture** (Rode), 10C-97.

10.3-3

551.509.313(02)

†Brandejs, Stanislav (*Met. Dept., Prague Univ.*), *Úvod do početní předpovědi počasí*. [Introduction to numerical weather forecasting.] *Geofysikální Sborník*, Prague, No. 61, 1957. 156 p. 23 figs., 23 tables, refs., numerous eqs. German and Russian summaries p. 153-156. **DLC**—This highly technical text is designed to thoroughly familiarize students or synoptic meteorologists with the theory and techniques of numerical forecasting. The study is divided into two parts, the first dealing with the quasi-static equations of atmospheric dynamics with pressure as an independent variable (hydrostatic equation; thermodynamic changes in time and space; geostrophic wind, divergence and vorticity; ageostrophic wind component; gradient wind and its divergence; continuity equation; vorticity equation; pressure tendency equations, etc.). The second part takes up the prognostic equations of various atmospheric models (barotropic, advective and baroclinic), their numerical and graphical integration, and their verification. The work incorporates the latest progress reported in international literature (with extensive references to the sources used), including full mathematical treatments of the methods described. As one of the first textbooks devoted entirely to numerical forecasting, this book may be considered the most direct way available to a clear understanding and mastering of this field, once the language difficulty is overcome. *Subject Heading:* 1. Numerical forecasting textbooks.—G.T.

10.3-4

51(02) 551.509.313(02)

Naslin, P., *Principes des calculatrices numériques automatiques*. [Principles of the automatic numerical calculating machines.] Paris, Dunod, 1958. 224 p. figs., tables, eqs.—This work consists of two parts: the former deals with the logical organization of a universal numerical calculating machine, and the latter with the technology of the numerical calculating machines. The object of this volume is to inform student, technician and engineer of the principles of the organization of automatic numerical calculating machines, of the methods used to establish their programs and of the technological nature of their main components. These fundamental ideas are presented in a simple way and numerous examples of calculations promote the understanding of the principles and functioning of the numerical calculating machines. *Subject Headings:* 1. Mathematics in meteorology 2. Numerical forecasting 3. Electronic computers.—A.V.

10.3-5

551.511.3(02) 551.509.313

Logvinov, K. T., *Dynamische Meteorologie*. [Dynamic meteorology.] Berlin, Deutscher Verlag der Wissenschaften, 1955. 154 p. 43 figs., 6 tables, 28 refs., eqs. **DLC** (QC 861.L814). Translation from original Russian, *Dinamicheskaya meteorologiya*, pub. 1952 (See 4.8-13, Aug. 1953, *MAB*). Review by F. Steinhäuser in *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Ser. A, 9(3):425-426, 1956. Review by M. Teich in *Zeitschrift für Meteorologie*, 10(8):252, Aug. 1956. Review by P. Raethgen in *Annalen der Meteorologie* 7(5/6):287-288, 1955/56. **DLC**—A German translation of a Russian textbook on dynamic meteorology intended for in-service training or for nontechnical students of meteorology. The basic equations of motion, thermodynamics, radiant heat or energy balance, moisture, statics

kinematics, gradient wind, turbulence, friction, frontogenesis, general circulation, heat transport, boundary processes and, finally, the numerical prediction of baric and thermic fields by the A. I. KIBEL' method (single station aerological method) are set forth and applications indicated without attempting to present the derivations of said equations. A few schematic diagrams are included. *Subject Headings:* 1. Dynamic meteorology textbooks 2. Kibel's method of forecasting 3. Numerical forecasting 4. Translations.—M.R.

MONOGRAPHS AND COMPREHENSIVE PAPERS

See also: Snow and Avalanches, Weissfluhjoch, Switzerland, 10.3-2; Oceanographic surveys, Japanese seas, 10.3-71; Annual met. summaries, Austria, 10.3-125; Annual met. reports, Chile, 10.3-126; Annual met. data summaries, Falkland Is., 10.3-127; Annual met. data summaries, Portuguese Colonies, 10.3-128; Radioactive tracers in hydromet. (Danilin), 10C-19; Heat and moisture balance of earth's surface (Gerasimov), 10C-35; Soil moisture research, U.S.S.R. (Rode), 10C-99; Capillary migration of soil moisture (Staprens), 10C-108; Soil moisture research (Veihmeier), 10C-125.

10.3-6

551.589(98)

*†Hare, F. Kenneth and Orvig, S., *The Arctic circulation: a preliminary review*. McGill Univ. Arctic Meteorology Research Group, Contract AF 19(604)-1141 and Contract AF 19(604)-1868, Supplement to Final Reports, June 30, 1958. 211 p. 82 figs., 12 tables, 129 refs., eqs. "Preliminary draft of part of a manual of Arctic meteorology being prepared jointly by Univ. of Wash. and McGill Univ."—This voluminous report contains a great deal of material on the climate of the Arctic with special emphasis on seasonal (winter and summer) upper air and synoptic or dynamic aspects of the climate. Much of the work was done at McGill University under contracts with U. S. Air Force (G.R.D.). The various chapters cover the problem of arctic circulation, the dynamic climatology of the North Polar circulation, the mean motion of the lower troposphere, the circumpolar vortex, the mean stratospheric circulation (above 16 km), climatology of synoptic systems (troposphere, tropopause and stratosphere) and, finally, nonadiabatic modifications of surface air in the Arctic. Many good synoptic examples, tables of derived data, etc. are included along with a good bibliography. *Subject Headings:* 1. Arctic synoptic climatology 2. Dynamic climatology 3. Arctic.—M.R.

10.3-7

551.586:551.553.11

*†Zenker, Helmut, *Über Land- und Seewinde an der Küste der Insel Usedom und ihre bioklimatische Bedeutung*. [Land and sea winds on the coast of Usedom Island and their bioclimatic importance.] Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer Dienst, Abhandlungen, No. 44, 1957. 70 p. 35 figs., 40 refs. DWB, DLC—A nice monograph taking up various aspects of the land-sea breeze on the coast of Usedom Island (in the Baltic), specifically at Heringsdorf Resort (on S.E. Coast in the Swinemünde Bay). The sea breeze on the Baltic, observational material (1953), wind direction changes; influence of sea breeze on temperature, on humidity, on cooling power and on sultriness; and the significance of the land-sea breeze on the air hygiene of the beach area (condensation nuclei count) are considered in separate chapters and illustrated by numerous thermo-hygro and other types of traces for the 11 days studied. Three types of sea breeze are recognized: (1) with convection (8-10 a.m.), (2) stable (6-9 a.m.), (3) with land wind all night, the sea breeze begins late (near noon) and lasts only a short time. Temperatures drop markedly when the third type sets in, and to a lesser degree for types 1 and 2. Humidities increase markedly with type 3. Cooling power increases with types 1 and 3 and to a lesser degree in type 2. Vapor pressure rises sharply at onset of type 3 and less for 1 and 2. The effects of the sea breezes on human comfort is emphasized throughout. *Subject Headings:* 1. Land and sea breeze effects 2. Cooling power during sea breeze 3. Sultriness during sea breezes 4. Usedom, East Germany.—M.R.

10.3-8

551.515.2(52)

*†Nishimura, Denzo, *Typhoon path forecast*. Tokyo, Meteorological Society, 1957. 146 p. Numerous charts and tables. Entirely in Japanese. Title romanized: Taifu no shinro yoso. DWB (M15.2 N724ta)—A study of about 70 important typhoons which affected Japan,

with 4 synoptic charts and a typhoon path chart for each case. The text is entirely in Japanese. Some statistical data accompanies each case history (pressure, wind direction and speed, precipitation, etc.). The typhoons are grouped into 5 categories (V, U, W, L and S) and characteristics of each category are discussed in some detail. The purpose of the study is to enable the forecaster to predict the path of typhoons in the Japanese area. *Subject Headings*: 1. Typhoon case history studies 2. Typhoon track forecasting 3. Japan.—M.R.

10.3-9

523.7

Houziaux, L. and Battiau, L. *Diffusion de la lumière par des particules sphériques d'indice de réfraction $m=1.33$* . [Diffusion of the light through spherical particles with refractive index $m=1.33$.] *Académie Royale de Belgique, Brussels, Classe des Sciences, Mémoires*, Collection in 4°, Sér. 2, 14(4), 1958. 33 p. 7 figs., tables, 5 refs. **DLC**—This memoir serves as an introduction to the study of the comet's continuous spectrum, which results not only in the reflection of the solar light by the nucleus, but also in the diffusion through the electrons, the atoms, the molecules and the dusts of the head and the tail. Values of the mean intensity functions of the Mie scattering theory have been computed for three simple size distribution functions and for the following values of the parameters: $m=1.33$; $x=0(0.4)5.2$; $\theta=0^\circ(10^\circ)180^\circ$. The degree of polarization is also reported in the tables. Some of the results are displayed in figures. *Subject Headings*: 1. Comet spectra 2. Refractive index.—A.V.

10.3-10

551.58:551.579:63(47,584)

*USSR. Glavnoe Upravlenie Gidrometeorologicheskoi Sluzhby, *Agroklimaticheskie i vodnye resursy raionov osvoeniia tselinykh i zaleznykh zemel'*. [Agroclimatic and water resources of the region of utilization of virgin and of waste land.] Ed. by F. F. Davitaia. Leningrad, Gidrometeoizdat., 1955. 463 p. 206 figs., 155 tables, eqs. **DLC** (S600.R83)—A large volume containing a multitude of original charts and tables, nomograms and graphs of factors important in agricultural and reclamation developments throughout the region stretching from the Ukraine to central Asia and the Far East. Temperature, frost, temperature limits, degree days above various values, precipitation, drought, dry winds, heavy rains, snow, snow depth, duration, dates of first and last snow, water content, runoff, relation of water supply to runoff, wind energy resources, evaporation from various types of surfaces (lakes, rivers, reservoirs, soil, etc.), and the specific climatic factors in regions of wheat, cotton, corn, millet and other culture are treated in detail; water resources with extensive hydrological data and analysis; climatic diagrams showing complex of weather factors each month; nomograms for forecasting or estimating numerous agroclimatic factors; circulation factors as affected by topography, regions (geographical and vegetative), unfavorable weather (freezes, droughts and dry winds), etc. The appendix contains extensive tables of precipitation probability for each agricultural month and for each major region, also average long period temperature and precipitation data (including limiting dates) for 20 stations in these various administrative territories or regions of the area involved in the study. Over a score of authors contributing to the 14 parts of the work are listed in the introduction. *Subject Headings*: 1. Agricultural climatology of U.S.S.R. 2. Water resources, U.S.S.R. 3. U.S.S.R. (European and Asiatic).—M.R.

10.3-11

551.577.36(75)

*U. S. Weather Bureau, *Rainfall intensity-frequency regime, Pt. 2, Southeastern United States*. Its *Technical Paper*, No. 29, March 1958. 51 p. figs., tables, 13 refs. **DWE** (M(055) U587t)—In detailed charts and tables, the rainfall intensity-duration-area frequency data are given for durations of 20 min to 24 hrs from point area to 400 sq mi and for return periods of 1 to 100 yrs for the area south of 35°N and from 80° to 90°W (Alabama, Georgia, Florida, most of S. Carolina and Mississippi). Tables also give maximum annual 24-hr rainfall from 1900-1956 for 7 stations and maximum annual 10 min, 1, 2, 3, 6, 12 and 24 hr rainfall for each year 1901-1956 for Hatteras, Miami and New Orleans. Various other relationships such as diurnal, seasonal and hurricane distributions, frequency analysis techniques, etc. are treated; maps and charts, etc. are included. *Subject Headings*: 1. Rainfall intensity-frequency data 2. Rainfall probability data 3. Southeastern United States.—M.R.

10.3-12

551.594.21

Reynolds, S. E., Brook, M. and Gourley, Mary Foulks, **Thunderstorm electricity**. New Mexico. Institute of Mining and Technology. Research and Development Branch, Project DA 3-99-07-022, Final Report for period of May 7, 1953 to Aug. 7, 1955. 47 p. 10 figs. (incl. photos), 36 refs. **DWB**—A summary of work done during 2-year period in the laboratory on electrification of ice, and application to graupel-ice electrification processes in thunderstorms at temperatures much below freezing. A graupel pellet growing by accretion of supercooled drops acquires a negative charge by collision with ice crystals. Ice also gets a negative charge when rubbed against a colder substance. Ice formed by accretion on graupel adds (latent) heat to graupel pellet—hence, accreting particles are always warmer and acquire a negative charge. Graupel pellets in falling distribute negative charge in manner and with magnitude of charge observed. *Subject Headings*: 1. **Thunderstorm electricity** 2. **Electrification of ice** 3. **Electrification of graupel** 4. **Electrical charge separation mechanisms**.—*M.R.*

10.3-13

551.576.1:629.135.2

†Rouleau, Wilfred T., **Suppression of condensation trails**. Carnegie Institute of Technology. Dept. of Mechanical Engineering, Contract AF 18(600)-969, Final Report, Part 2, Nov. 1956. 60 p. 27 figs. (incl. photos), tables, 22 refs., eqs. **DWB** (M055 C289s)—An intensive and extensive laboratory study of trail characteristics and means of suppressing them is reported with many large photographs of equipment, particles magnified 4200 times, data curves, etc. It was found that limiting the droplets to a certain maximum size actually did suppress the size and visibility of the contrail. Experiments were also aimed at determining effect of limiting droplets to a certain minimum size and of introducing ice crystals to prevent or suppress visible trails. *Subject Headings*: 1. **Contrail suppression** 2. **Drop size effect on visibility of contrails**.—*M.R.*

10.3-14

551.506.7:551.547

*†Jacobs, Ingrid, 5- bzw. 40-jährige Monatsmittel der absoluten Topographien der 1000 mb-, 850 mb-, 500 mb-, und 300 mb Flächen sowie der relativen Topographien 500/1000 mb und 300/500 mb über der Nordhemisphäre und ihre monatlichen Änderungen, Folge 1. [Five- and 40-year monthly means of absolute topography of 1000 mb, 850 mb, 500 mb, and 300 mb surfaces and of the relative topography of 500/1000 mb and 300/500 mb over the Northern Hemisphere and their monthly variations, Pt. 1.] Berlin. Freie Universität. Institut für Meteorologie und Geophysik, *Meteorologische Abhandlungen*, 4(1), 1957. 303 p. 103 charts, numerous tables. Pt. 2, *Ibid.*, 4(2), 1958. 121 p. numerous charts and tables, 164 refs. Biog. note, p. (123). **DWB**. English translation issued by Universität, 1957. Pt. 1, Text. 19 p. Pt. 2, **Charts and tables**. 305 p. [No refs. included.] **DWB** (M13 J176f). Review by J. K. Bannon in *Royal Meteorological Society, Quarterly Journal*, 85(363):78, Jan. 1959.—Nicely drawn 5-yr mean charts for the N. Hemisphere (except the Pacific and East Asia portions) for each month and the year as a whole (1949-53 averages), and actual 310 station grid-point data on which charts are based, are presented for the mean absolute topography of the 1000, 850, 500 and 300 mb surfaces and the 500/1000 and 300/500 mb relative topography. The 19 page text in translation contains a description of the project which was supported by the U.S.A.F. (since 1953) including a listing of sources of data, a list of stations in the network, difficulties which have to be ironed out, techniques of constructing each chart, accuracy and a summary of results. *Subject Headings*: 1. **Monthly mean absolute topography charts** 2. **Northern Hemisphere mean upper air charts** 3. **Upper air mean absolute topography data N. Hemisphere**. I. Berlin. Freie Universität. Institut für Meteorologie und Geophysik.—*M.R.*

10.3-15

551.526:551.509.318(261)

*Pagava, S. T.; Aristov, N. A.; Bliumina, L. I.; Zakharova, N. M. and Sevalkina, N. A., *Vliiani Severnoĭ Atlantiki na razvitie sinopticheskikh protsessov*. [Influence of the North Atlantic on the development of synoptic processes.] Ed. by N. V. Sagatovskii. Moscow, Gidrometizdat, 1958. 71 p. 31 figs., 22 tables, 13 refs., eqs. At head of title: Tsentral'nyi institut Prognozov.—This monograph contains a systematic exposition, based on the latest research, of the characteristics of the sea and air temperature over the North Atlantic, their

correlation and their relation to the formation of natural synoptic processes affecting continental Europe. The interaction between the sea and the atmosphere is quantitatively demonstrated in many ways, especially with respect to influence of sea temperature anomalies on 500 mb circulation types, centers of 500 mb anticyclones or of 500/1000 mb anomaly centers. Scores of illustrative tables, charts and diagrams are included. Diurnal and interdiurnal changes in sea temperature at ocean weather ships are given special attention in the analyses. *Subject Headings:* 1. Ocean-atmosphere interaction 2. Ocean temperature effects on European synoptic processes 3. North Atlantic influences 4. Extended forecasting 5. Natural synoptic processes 6. North Atlantic.—*M.R.*

10.3-16

378:061.6(47)

†Vucinich, Alexander, *The Soviet Academy of Sciences*. *Stanford Univ., Hoover Institute and Library, Studies, Ser. E, Institutions*, No. 3, Jan. 1956. 157 p. Periodicals published by the Academy, 1953, p. 132-133. Refs. at end of each ch. Bibliog. p. 143-150. DWB (067 V986s)—A lengthy study, based on information in the Hoover Library, of the organization of the Academy of Science in the Soviet Union and the social role of science and scientists in the U.S.S.R. The history of the Imperial Academy of Science since Peter the Great, the formal organization and relation to the Party; the scientific heritage, role of theory and applied science and its relation to ideology and the general plan, social structure, tendencies and a list of the affiliates in the various Republics, a list of periodicals published by the Academy, of academicians and their fields (1955), and year of election, a bibliography and index are included. Several names familiar to meteorologists and oceanographers are listed. The work is well documented. *Subject Headings:* 1. Soviet Academy of Science 2. U.S.S.R.—*M.R.*

10.3-17

551.582.1(549)

*†Khan, Azra Ihsan-ur-Rahman, *Contributions to the study of the climate of the Punjab and the North West Frontier Province (Pakistan)*. 1953. 195 p. 38 figs., 61 refs., tables. Thesis (Ph.D.)—Clark Univ., Worcester, Mass. Biog. note preceding p. i. Photostat of typescript. DWB (M82.1/545 K45co)—Climatic controls, the monsoons and westerly depressions, seasonal temps., pressure and winds, precip., a detailed discussion of climatic regions according to KÖPPEN, and a discussion of the variability of precip. in West Pakistan are treated in this thesis. Numerous maps and charts, graphs and tables of data and a good bibliography are included. *Subject Headings:* 1. Climate of West Pakistan 2. West Pakistan.—*M.R.*

10.3-18

551.524.3:551.526.6(261)

*†Rosenthal, Stanley and Gleeson, Thomas A., *Investigation of the variability of surface air temperature over the North Atlantic Ocean*. Florida State Univ. Dept. of Meteorology, Contract Cwb-9272, Final Report, Aug. 5, 1958. 120 p. 27 figs., 141 tables, 41 refs., 59 eqs. DWB—A voluminous report based on a study of four or five years of data from nine North Atlantic Weather ships. Diurnal variation of mean temperature, the aperiodic diurnal range of temperature, maximum and minimum temperatures at the ocean stations, mean daily temperature, the interdiurnal variability of temperature, and frequency distribution of three hourly temperatures at the Atlantic Weather Stations are discussed in detail in several chapters. The vertical heat balance in the surface air layers and the actual diurnal temperature range are presented as frequency distributions. Both the physics and the statistical analyses are used in preparing models. The diurnal curve and frequency distribution are found to be very close to the theoretical or normal. Means are found to lie within 1°F of medians in this area. At least half of the report is tables and graphs. Thus regression equations can be used to describe the range or variability of the temperature at any similar location if the mean and s.d. of the parameter is known. Also it was found that the mean highest temperature occurs in mid-day in winter and late in afternoon in summer over the oceans, whereas the minimum occurs several hours before sunrise in winter. *Subject Headings:* 1. Temperature at ocean weather stations 2. North Atlantic weather stations 3. North Atlantic.—*M.R.*

10.3-19

551.589.5:551.509.3

*†Calef, Wesley; Lackey, Melvin; Trotter, John; Lamb, Robert and Wray, James (a. Chic. U.), *Winter weather type frequencies, Northern Great Plains*. *U. S. Quartermaster*

Research and Engineering Center. Environmental Protection Research Div., Technical Report EP-64, Aug. 1957. 260 p. 99 figs., graphs, 175 tables, 87 refs. DWB (M86 U585t)—An attempt to devise a system for presenting weather data for a region (or place) in an integrated manner through "types" is made and demonstrated at great length on the basis of monthly maximum and minimum temperature frequencies, and of temperature, precipitation, humidity, cloud and wind data for winter for the Great Plains. Ten years (1942–52) of record for 16 stations were classified according to weather types which could involve 1200 possible combinations if precipitation were used, but actually only 600 since precipitation was not used. Monthly and seasonal frequencies of these types were tabulated and analyzed for Cheyenne, Bismarck, Havre and Huron. Various other systems of complex, climatic or synoptic weather typing are reviewed. Durations and cumulative frequencies, as well as extremes and quantile values are tabulated and presented graphically for the 16 stations, ranging from Havre, Montana to San Antonio, Texas. The analytical as well as the synthesized frequencies are given for the various elements in various forms. Cooling power is discussed in the last chapter and a good chronological bibliography of works on synoptic types, natural synoptic periods, spells and daily weather types is appended. *Subject Headings:* 1. Weather type frequencies 2. Winter weather types 3. Synoptic climatology 4. Climate of Great Plains 5. Great Plains.—M.R.

10.3–20

551.584(798)

*Mather, J. R. and Thornthwaite, C. W., *Microclimatic investigations at Point Barrow, Alaska, 1956.* Drexel Institute of Technology, Lab. of Climatology, *Publications in Climatology*, 9(1):1–51, 1956. figs., tables, eqs. DWB—A comprehensive program of microclimatic observations was carried out at several sites at or near Point Barrow, Alaska during the summer of 1956 under the direction of C. W. THORNTWHAITE, and the Drexel Institute Lab. of Climatology. Instruments (evapotranspirometers, radiation, wind profile, air and soil temperature and dew point) were developed for the rigorous Arctic conditions. Sites are described and shown on a detailed map, instruments of all types described and illustrated, the observational program outlined, and a substantial analysis of the heat and moisture balance and an evaluation of the results plus outline of the next year's program included. The basic data obtained every 2 hours during the significant periods are presented in tables. *Subject Headings:* 1. Microclimatic research programs 2. Evapotranspiration in Arctic 3. Wind profiles 4. Point Barrow, Alaska. I. Hacia, H. II. Shellabear, W. H. III. Superior, W. J. IV. Ware, S. J.—M.R.

10.3–21

551.510.42

†Olpińska, Kazimiera and Słomka, Jan, *Przebieg roczny zapylenia powietrzawe Wrocławiu.* [Atmospheric pollution in Wrocław.] *Wrocławskie Towarzystwo Naukowe, Prace, Ser. B*, No. 92, 1957. 30 p. 10 figs. (some fold.), 6 tables, 13 refs. DWB (M21.11 S634us)—Methods and results of atmospheric pollution measurements carried out on the lawn of Wrocław University Observatory from Nov. 1, 1952 to Oct. 31, 1953 according to the Owens method are presented and illustrated by a series of tables, graphs and figures. It was found that the main source of air pollution in the cold period (Oct.–March), which is three times greater than in the warm half year, is smoke produced by heating; it amounts on the average to 127 dust particles per m³. A study of the interdependence between air pollution and some meteorological factors (origin of air masses, direction and speed of wind) proved to be of little importance. *Subject Headings:* 1. Atmospheric pollution 2. Wrocław, Poland.—A.M.P.

10.3–22

551.589(439.1) 551.509.312

*Péczely, György, *Grosswetterlagen in Ungarn.* [Large scale weather situations in Hungary.] *Hungary. Országos Meteorológiai Intézet, Kisebb Kiadványai*, No. 30, 1957. 86 p. tables, 4 refs. On t-p: *Kleinere Veröffentlichungen der Zentralanstalt für Meteorologie*, Budapest. DWB (M(055) H936ki)—A catalog of large-scale synoptic weather situations for each day of each month from 1877 to 1956 is accompanied by a description and illustration (with synoptic charts) of each type and an analysis of the frequency, duration and singularities in the respective types. Geographic and climatological as well as synoptic consideration are incorporated. *Subject Headings:* 1. Macrosynoptic weather catalogs 2. Synoptic climatology, Hungary 3. Large scale weather processes 4. Hungary.—M.R.

10.3-23

551.510.52/53:551.513.2:551.557.5

†§Defant, F. and Taba, H. (*both, Int. Met. Inst. Stockholm*), **The strong index change period from Jan. 1 to Jan. 7, 1956.** *Tellus*, Stockholm, 10(2):225-242, May 1958. 10 figs., 22 refs. **DWB, DLC**—Tropopause charts for the entire Northern Hemisphere are presented for each day, Jan. 1 through 7, 1956, to show the 3-dimensional structure of the atmosphere, the distribution of cold and warm air masses, the location of the main jet streams, etc. The temperature gradients on the tropopause chart give a good indication of the location and structure of the belts of maximum westerly winds at that level, meandering and bifurcation of the jet stream and strong interchange of tropical air with polar. The difference between meridian and zonal types at different levels, the interpretation of vertical temperature field during the period, Jan. 1-7, 1956, and the possible mechanisms of index changes are discussed at some length. *Subject Headings:* 1. Tropopause-jet stream relationships 2. Circulation index changes 3. Meridional exchange at tropopause.—*M.R.*

10.3-24

536.22:551.558.1

†Ostroumov, G. A., **Free convection under the conditions of the internal problem.** Trans. of his *Svobodnaia konveksiia v usloviakh vnutrennei zadachi*, pub. by State Pub. House, Technico-Theoretical Literature, Moscow-Leningrad, 1952. Trans. by S. Reiss. Issued as *U. S. National Advisory Committee for Aeronautics, Technical Memorandum*, 1407, April 1958. 233 p. 57+27 figs. and photos, 11 tables, bibliog. p. 186-189, numerous eqs. **DWB** (620.1308 U585tm)—A translation of a textbook covering thoroughly the mathematical, physical or theoretical and experimental aspects of free and forced convection (in liquids) in a gravitational field, including (as well as industrial applications) geophysical phenomena such as natural convection in wells and underground reservoirs. Density differences arise from temperature and composition. Temperature convection is the form most thoroughly treated in this work. The advanced ideas of M. V. LOMONOSOV in his work on atmospheric phenomena arising from electrical forces (1753) are quoted with respect to his theory of thermal convection causing thunderstorms and frosts. He had accurately observed motions of cloud particles, smoke or dust in vicinity of storms, mountains or buildings and chimneys and over fields and bodies of water, in relation to sunshine and shade, and even the magnitude of the vertical motions (up and down) and the inflow of air from cold or shady areas to hot or sunny areas. This was almost simultaneous with FRANKLIN's theories of thunderstorm formation and electricity. The author proposes to treat more exhaustively the subjects of thermal diffusion and of convection in gases in nature and in flues. *Subject Headings:* 1. Convection in fluids 2. Lomonosov's convection theory. I. Reiss, S. (trans.) II. Lomonosov, M. V.—*M.R.*

10.3-25

551.5:551.508.8:551.510(02)

Molchanov, Pavel Aleksandrovich, **Atmosfera.** [The atmosphere.] Moscow, Akademiia Nauk SSSR, 1938. 135 p. 27 figs. (incl. photos). **DLC** (QC861.M65)—A small technical book on aerological aspects of meteorology, for elementary use (edition of 12,000 copies). The several chapters cover the basic physical properties of the air, aerological instruments (kites, meteorographs, radiosondes, balloons, stratostats), composition and temp. of air with height, clouds, wind, air masses, fronts, troposphere, stratosphere and a great deal about the Soviet and American stratosphere flights of the 1930's. *Subject Headings:* 1. Aerological textbooks 2. Stratostats.—*M.R.*

MANUALS, ATLASES AND HANDBOOKS

10.3-26

551.501.45:551.521.3:551.593.1(02)

*Boll, R. H.; Leacock, J. A.; Clark, G. C. and Churchill, S. W., **Tables of light-scattering functions: relative indices of less than unity, and infinity.** Ann Arbor, Michigan, Univ. of Michigan Press, published for the Engineering Research Institute, 1958. 360 p. almost entirely tables, 14 refs. **DLC**—This is the first set of light scattering function tables published in book form (nicely bound, with data in tables reproduced directly from computer tabulations), but the sixth set of such tables prepared by the Dept. of Chem. and Metallurgical Engineering of the Univ. of Mich. since 1951. The tables are for indices of refraction of infinity (a per-

fectly reflecting sphere) and of less than unity. The mathematical definitions for the Mie solutions are briefly presented, physical significance outlined and the tables described. A list of previously compiled tables is given in the bibliography. The first tables are of the light scattering coefficients and the main body of tables are the amplitude functions. *Subject Headings: 1. Light scattering function tables 2. Mie scattering coefficient 3. Legendre polynomials.*—M.R.

10.3-27

551.582(484.9) 656.61(261.2)

*Hamburg. Deutsches Hydrographisches Institut, **Nordsee-Handbuch östlicher Teil von Hanstholm bis Terschelling**. [Handbook of the North Sea, eastern section from Hanstholm to Terschelling.] 12th ed. Hamburg, 1958. 758 p. 197 figs., 79 charts, tables. Laid in pocket: **Radar-Küstenansichten aus dem Gebiet der östlichen Nordsee** [Beiheft zum Nordsee-Handbuch, östlicher Teil]. Hamburg, 1958. 32 p. 30 figs. both its No. 2006. DWB (M82/484.9 H199n)—The 12th ed. of this standard "Coast Pilot" for the eastern part of the south coast of the North Sea contains revised material from the Dutch, Danish and German Coastal Survey charts—in all, about 150 pages more material than in the 11th (1949) ed. The German Hydrographic Institute is described on p. 17-18, including its substations, storm warning and storm flood warning service. German and foreign nautical charts are then described on p. 18-27. A section on climate and weather on p. 169-233 covers twice as many pages as the 1949 edition. It was prepared by the Seewetteramt. The section takes up general climate of the North Sea area, examples of weather situations (storms, great storm of Feb. 1, 1953, summer Northwest storms, icy S.E. storms, winter fog, etc.), sea and air temps., frost, pressure, wind frequency, gale frequency, cloud, humidity, snow, fog visibility frequencies, sea and swell, ice, salinity and sea temp., tides, effect of wind on height of tide, and tidal currents, including data tables and charts. *Subject Headings: 1. Coast pilots 2. Sailing directions 3. Climate of North Sea 4. North Sea Coast (Germany).*—M.R.

10.3-28

551.510.62:551.510.535(02)

de Maximy, Georges, **L'ionosphère et la prévision des fréquences en télécommunications (propagation des ondes décamétriques)**. [The ionosphere and the forecasting of frequencies in telecommunication: propagation of decametric waves.] Paris, Editions Chiron, 1953. 54 p. 23 figs. (*Les Cahiers de l'Opérateur Radio*.) DLC (QC973.M3)—A practical manual with tables, nomograms, graphs, forms and examples, covering in several chapters the basic information on radio propagation, the ionosphere (structure, sounding, variations, storms), refraction and absorption in D layer, forecasting frequencies, solar relations, curves for prediction of propagation of decameter waves and tables for determining the most useful frequencies. *Subject Headings: 1. Ionospheric prediction manuals 2. Radio wave propagation.*—M.R.

10.3-29

551.509.58:551.576.1:629.135.2(02)

U. S. Office of Naval Operations, **Condensation trails**. Its *NAVAER 50-1P-522* (formerly 50-1P-254), July 15, 1953. 5 p. fig., table. DWB—A brief manual giving definitions of three types of contrails, factors involved in their formation, graphical aids and forecast procedures. A nomogram is attached. The types considered are: 1) aerodynamic, 2) instability and 3) exhaust trails. *Subject Heading: 1. Contrail forecasting manuals.*—M.R.

10.3-30

551.557:623.451.519(02)

Sissenwine, Norman, **Development of missile design wind profiles for Patrick AFB. U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics**, No. 96, March 1958. 17 p. 4 figs., 4 tables, 11 refs. DWB, DLC—Design wind profiles are presented for 0 to 100,000 ft for 1%, 5%, 10% and 20% calculated risk for winter at Patrick AFB, Fla., for use in evaluating wind stresses on vertically rising missiles. Wind shears for 3000 ft layer near or just above peak speed (35-45 thousand ft level) are indicated. Method of calculation of profiles, using shear data from Bedford, Mass., source of data and samples of data showing shears, 12 km wind speeds, and for alternative method means, standard deviations, and coefficients of correlation between levels for each component and between components at each level are presented and discussed. Data were obtained from high altitude wind soundings

with AN/GMD-2 at Bedford, Mass., and -1 equipment at Patrick AFB, Fla. *Subject Headings*: 1. Missile design wind profiles 2. High level wind shear 3. Patrick AFB, Fla. 4. Bedford, Mass.—*M.R.*

POPULAR METEOROLOGY

10.3-31

551.5(02)

Visser, S. W., *Het weer*. [The weather.] Ed. by Ad. Donker, Rotterdam, 1957. 216 p. 54 figs., 6 refs.—The author has written this book, omitting theories with too much finicky detail, without recourse either to mathematical or physical formulas, so that this work might be understood by persons not acquainted with meteorology. He has restricted himself to the essential facts and has explained them in a very clear style. He begins with the explanation of the meteor; he goes back to the ancient classical conception and traces it all the way from that idea to modern meteorology. The central figures are the meteorologist and the physicist; the author only breaks in when they make the explanation of phenomena too difficult. The author achieves his end in fifty rather short chapters, quoting sentences of VONDEL and poems of HELENA SWARTH and GOETHE dealing with the description of the weather. The author and editor have prepared a book which will succeed in satisfying entirely the reader through its original presentation. *Subject Heading*: 1. Popular meteorology books.—*A.V.*

10.3-32

551.5(023)

Miller, M. F. and Decker, W. L., *Let's look at the weather*. *Missouri. Agricultural Experiment Station, Bulletin*, No. 678, Jan. 1957. 31 p. charts, photos. *DWB* (M M647L)—Basic knowledge about physical processes in the atmosphere is presented in a lucid manner with attractive photographs and diagrams. The structure and composition of the atmosphere, the hydrologic cycle, cloud forms, instruments for use by amateurs, the general circulation, weather forecasting, weather lore and almanacs are among the subjects discussed. Samples of climatic data for Missouri are presented in diagrams. *Subject Headings*: 1. Popular meteorology 2. Climatic data 3. Missouri.—*G.T.*

10.3-33

551.55

Mezentsev, V. A., *Veter*. [Wind.] Moscow, Gos. Izd-vo Kul'turno-Prosvetitel'noi Lit-ry, 1947. 62 p. 23 figs. *DLC*—A popular pamphlet giving information regarding the many aspects of wind, winds and wind power utilization. The nature of air currents, causes of winds, winds of the world, trade winds, föhn winds, desert winds, squalls, tornadoes, waterspouts, hurricanes, wind force, dust storms, loess, sand storms, windmills and, finally, modern wind generators are discussed and illustrated. *Subject Headings*: 1. Wind 2. Wind power 3. Wind generators 4. Popular meteorology.—*M.R.*

10.3-34

551.507.362.2

Buedeler, Werner, *Operation Vanguard: earth satellite*. Trans. by A. L. Helm [from the orig. German *Projekt Vorhut*]. London, Burke, 1957. 128 p. figs., photos. *DWB* (629.1388 B928 op)—A popular and somewhat less than prophetic account of the Vanguard project which was to launch the first man made satellite into space during IGY. The various chapters discuss in glowing terms the beginning of the new "space age," the history of rocketry, the various aspects of artificial satellites, their scientific uses, their practical value, future space platforms and more complicated satellites and, finally, "man and space flight." The illustrations of the U. S. Navy's Vanguard satellites and rockets, etc. are excellent. The book was issued before Sputnik, but made mention of Soviet interest in such developments. *Subject Headings*: 1. Project Vanguard 2. Satellite observatories.—*M.R.*

10.3-35

91(99) 551.582.1(99)

Fricker, Karl, *Antarktis*. [The Antarctic.] Pub. Berlin, Schall & Grund, 1898. 230 p. figs., photos, bibliog. (Bibliothek der Länderkunde). *DLC*—Besides 5 chapters dealing with the geography, history of expeditions, topography, geology, vegetation, fauna and prospects for future Antarctic research, this remarkable book contains a chapter (p. 177-190) on the climate and one (p. 191-209) on the ice conditions of the Antarctic. The remarks on climate are limited (except for generalizations based on astronomical, continent-ocean, and latitudinal

considerations), to a few temperature, precipitation, wind and humidity observations made by Ross (1841-2) in Victoria Land (to 78°S) and by the "CHALLENGER" (to 66½°S). A polar temperature and a pressure and wind chart are included. Ice conditions are described in more detail and illustrated. *Subject Headings:* 1. Antarctic climate 2. Antarctic expeditions 3. Antarctica.—M.R.

NEW SERIALS

10.3-36

551.574.1(05)

Nubila, Vol. 1, No. 1, 1958. Quarterly. Issued Verona, Italy, by Unione Nazionale Antigrandine. Editor: Ovidio Romanelli. Editorial Committee: G. Fea; F. H. Ludlam; E. Rosini; P. M. Saunders and O. Vittori. Price: annual, Lira 1,500. Short and long contributions in field of physics and dynamics of clouds and hydrometeors, etc. Papers in English, with summaries in English and Italian. "Contributions from Italian authors will sometimes be printed in original Italian in *Rivista di Meteorologia Aeronautica*." First issue consists of one article, LUDLAM, F. H.: **The hail problem** (abstracted separately). DWB—The Italian "Unione Nazionale Antigrandine" (National Hail Prevention Union), presided over by GINO SARTORI, has sponsored the publication of this quarterly. The first issue is nicely printed and edited. The cover represents a facsimile of an original manuscript by ALESSANDRO VOLTA (preserved at Milan) dealing with hailstone structure observations made by VOLTA at Como in the summer of 1800. *Subject Headings:* 1. Cloud physics journals 2. Hail suppression 3. Serial publications I. Romanelli, O. (ed.).—M.R.

TRANSLATIONS

See: Dynamic meteorology text (Logvinov), 10.3-5; *Convection in fluids* (Ostroumov), 10.3-24.

GENERAL GEOPHYSICS AND METEOROLOGY

IGY

10.3-37

550.3:551.506.22:778.142

Meteorologische Daten des Internationalen Geophysikalischen Jahres 1957/1958. [Meteorological data for the IGY, 1957/1958.] *Meteorologische Rundschau*, Berlin, 10(5):174, Sept./Oct. 1957. DWB, DLC—The IGY meteorological data will be gathered at least in one central place, the WMO Secretariat at Geneva. The data will consist of four series of microcards, namely: synoptic land surface observations, synoptic sea surface observations, radiosonde and rawin observations, and upper altitude wind observations. It is expected that all the meteorological observations will cover 18,500 cards. The price of the complete set will be \$6000. *Subject Headings:* 1. IGY data center 2. IGY meteorological program 3. IGY microcards 4. WMO Secretariat.—I.L.D.

10.3-38

551.510.535:551.506.22(98)

Shapley, Allan H., **The ionosphere IGY programme in the Arctic.** *International Geophysical Year, 1957/1958, Comité Special, Bulletin d'Information*, No. 7:60-62, 1956. DWB—Ionosphere program is closely linked with the auroral and geomagnetic and even the cosmic ray programs. Behavior of the ionosphere in auroral regions and features at or near the North Pole during polar day and polar night will be investigated. Hemispheric symmetry will be studied by comparing Arctic and Antarctic data. Vertical soundings, studies of absorption, drifts, atmospheric noise (8 stations in Arctic) and sferics (1 station in Spitzbergen), whistlers and other phases of Arctic-ionospheric program are discussed. *Subject Headings:* 1. Arctic ionosphere stations 2. IGY Arctic ionosphere program 3. Arctic.—N.N.

10.3-39

551.506.22:551.507.362

Poloskov, S. M. and Mirtov, B. A., **The study of the upper atmosphere by means of rockets, at the Academy of Sciences, U.S.S.R.** *British Interplanetary Society, Journal*,

16(2):95-100, April/June 1957. "Paper presented at the Congrès International des Fusées et Engins Guidés et d'Équipements, Paris, 3-8 Dec. 1956." **DLC**—The Russian rocket program planned for IGY is outlined. It involves study of the atmospheric structure, movements, electrical properties, cosmic and UV rays, micrometeorites and corpuscular rays from the sun at high altitudes. Particulars of the rockets, the ejected instrument containers (parachuted to the ground), the composition of the atmosphere at 80-95 km, pressure at 50-110 km, wind direction and speed at 60-80 km, etc. are given. *Subject Headings*: 1. Soviet IGY rocket program 2. IGY rocket program 3. Upper atmosphere research. I. Dorling, E. B. (trans.).—*M.R.*

10.3-40

551.501.721:551.508.21

Sauberer, F., **Errichtung eines Stahlturmes am Sonnblickobservatorium**. [Erection of a steel tower at Sonnblick Observatory.] *Wetter und Leben*, Vienna, 9(3/5):75-77, 1957. **DLC**—Radiation measurements on the Sonnblick have been hampered by the lack of a free horizon so that pyranometer measurements had to be made on the southern slope, 12 m below the observatory building and away from disturbances by reflections from ice and snow. Accordingly, in connection with the IGY program, a 10 m high steel tower having a platform level with the observatory was erected. The installation of radiation instruments on this tower is described and a photograph of the tower is presented. *Subject Headings*: 1. Radiation measurement equipment 2. Tower observations 3. Sonnblick, Austria.—*I.L.D.*

10.3-41

551.594.51:551.506.22

Barbier, D., **L'observation visuelle des aurores pendant l'Année Géophysique**. [Visual auroral observations during the Geophysical Year.] *La Météorologie*, Paris, Ser. 4, No. 44:393-404, Oct./Dec. 1956. figs. French, English and Spanish summaries p. 393. **DWB**—The development of an aurora is described by the author as a process taking place in three stages and the mechanism underlying the occurrence of an aurora as postulated by STÖRMER, and by CHAPMAN and FERRARO is discussed briefly. This is followed by an account of various auroras observed at lower latitudes, the importance of such auroras, the auroral program in the IGY, the participation of the WMO in the program of auroral observations during the IGY including nature of observations, auroral observation networks, observation procedure, auroral notations and position, collection of observations, etc. An outline of the procedure for making visual observations and their standardized recording is given. A series of drawings showing various types of auroras is presented. *Subject Headings*: 1. IGY auroral program 2. Auroral observations.—*I.L.D.*

10.3-42

550.3:551.506.22(45)

Pellisari, L., **Partecipazione dell'Italia all'Anno Geofisico Internazionale**. [Participation of Italy in the International Geophysical Year.] *Rivista di Meteorologia Aeronautica*, Rome, 17(4):58-59, Oct./Dec. 1957. **DWB**—Special emphasis is placed on the participation of the Servizio Meteorologico d'Aeronautica in IGY. A score of stations will make special actinographic observations; radiowind soundings and observation of condensable water vapor in the atmosphere will be made at a few stations, and 3 other stations will have Dobson spectrophotometers for ozone measurements. Condensation nuclei will be counted at the Monte Cimone Observatory; atmospheric electricity at the Vigna di Valle Observatory; atmospheric radioactivity at 15 stations, and solar astrophysical and geophysical work elsewhere. *Subject Headings*: 1. Italian participation in IGY 2. IGY program.—*M.R.*

10.3-43

551.507.362.2:551.506.22

Baumeister, Peter, **Die wissenschaftlichen Aufgaben der künstlichen Monde**. [Scientific objectives of artificial satellites.] *Orion*, Munich, 11(7/8):267-271, April 1956. 3 figs. **DLC** (Q3.075)—A semitechnical article on the proposed satellite program (Project Vanguard) of the U. S./IGY Committee. Trajectories, stages, etc. are illustrated and various research programs outlined in some detail. *Subject Headings*: 1. Satellite observatories 2. Project Vanguard 3. IGY satellite program.—*M.R.*

WMO

10.3-44

551.5:061.3

Sutton, Sir Oliver Graham, **World Meteorological Organization ninth session of the Executive Committee.** *Meteorological Magazine*, London, 86(1026):353-354, Dec. 1957. DWB—Session took place at Geneva, Sept. 20 to Oct. 14, 1957. All members were present except DR. SOLOTONKHINE (U.S.S.R.) who was represented by M. A. IVANOV. Four presidents of the Technical Commission attended some of the meetings. Internal staff rules of the Secretariat and recommendations of CAE, CIMO, CMM and CCL were considered, as well as budget and fiscal matters and items relating to the Congress. Strong support of hydrology was recommended. The coming of jet operations to aviation is placing added responsibilities on WMO. The data collection center, a permanent building for WMO, and problems due to rising costs are reviewed. *Subject Heading: 1. WMO Executive Committee meetings.*—M.R.

10.3-45

551.5:061.3

Munteau, R. L., **Second session of Regional Association III.** *World Meteorological Organization, WMO Bulletin*, 7(2):59-62, April 1958. photo. DWB—Second R.A. III meeting of WMO met at Library of University City, Caracas, Dec. 4, 1957. A. VIAUT, President of WMO, acted as chairman (in absence of R.A. III president and Vice-President.) D. A. DAVIES, Secretary-General of WMO, also spoke. Eight members were represented and observers from six outside members were present. W. A. GRINSTED was chairman of working group on synoptic meteorology, telephone communications, aeronautical and maritime meteorology; and CAPT. F. FARÍÑA SÁNCHEZ (Paraguay), of the one on instruments, climatology, hydrology and agricultural meteorology. Networks, transmissions, national meteorological committees for countries without a central meteorological service, technical assistance, and problems of agro-hydrology and climatology are reviewed. *Subject Headings: 1. WMO. Regional Association III (South America) 2. Caracas, Venezuela.*—M.R.

10.3-46

551.5:061.3:025.45

World Meteorological Organization, **Technical regulations.** 1st ed. Its *WMO [Publication]*, No. 49, BD.2 and 3, 1956. 2 v. Vol. 1, **General.** Vol. 2, **Meteorological service for international air navigation.** About 75 p. each. forms (some fold.). Laid in pocket of Vol. 1, List of deviations, No. 1, June 1956. DWB (M06 W927p, No. 49)—Vol. 1 gives concise regulations for international use in defining and conducting work at various types of meteorological stations. Surface observation, upper air observations, codes, telecommunications: synoptic analysis and forecasting, aviation climatology, bibliography and publications (the latest UDC scheme for 551.5 is appended); marine and agricultural, meteorological practices are outlined and described wherever well enough established to warrant standardized regulations. In the second, vol., the recommended practices for aeronautical meteorology are much more elaborately defined, with illustrations. *Subject Headings: 1. WMO technical regulations 2. Aeronautical meteorology regulations 3. U.D.C. for meteorology.*—M.R.

10.3-47

551.5:061.3

World Meteorological Organization. **Regional Association III (South America), Abridged final report of the Second Session, Caracas, Dec. 4-20, 1957.** *World Meteorological Association (Publication)*, No. 70.RP. 29, 1958. 104 p. DWB (M(016) W927p)—The complete report on agenda, attendants, transactions, resolutions, and annexes emanating from the second session of Regional Association III which met at the University of Caracas, Venezuela, Dec. 4-20, 1957. There were 9 planary meetings, under the presidency of A. VIAUT, President of World Meteorological Organization (in the absence of the president of Regional Association III). Eight member countries and 7 other countries (also FAO and ICAO) were represented by 37 delegates. Instruments, synoptic observations, codes, telecommunication, maritime meteorology, aeronautical meteorology, climatology, hydrology, technical assistance, and program for the interim between the second and third sessions were main agenda items. (See also 10.3-45.) *Subject Headings: 1. WMO, Regional Association III (South America) 2. WMO Regional Association reports 3. Caracas, Venezuela.*—M.R.

10.3-48

378.3:551.5:061.3

Zakharov, V. N., *Mezhdunarodnaia premiia*. [An international prize.] *Meteorologiya i Gidrologiya*, Leningrad, No. 9:67-68, Sept. 1956. Also: *Vruchenie premii Mezhdunarodnoi meteorologicheskoi organizatsii norvezhskomu uchenomu KH. T. Khessel'bergu*. [WMO prize awarded to the Norwegian scholar, Th. Hesselberg.] *Ibid.*, No. 2:66, Feb. 1957. Also: *Presentation of the second IMO prize*. *World Meteorological Organization, WMO Bulletin*, 7(3):134, July 1958. Also: Zigun, V. P., *Premiia Mezhdunarodnoi Meteorologicheskoi organizatsii*. [Prize of the International Meteorological Organization.] *Meteorologiya i Gidrologiya*, No. 4:60-61, April 1958. **DWB, DLC**—An account of the annual prize established by the WMO to be awarded for outstanding scientific achievement in meteorology or for signal services to international meteorological activity. The award consists of a gold medal and \$1,200. First recipient was TH. HESSELBERG. The names of the selection committee are given. The second article summarizes the recipient's career. HESSELBERG began his work in meteorology in 1912 as an assistant to BJERKNES; in that year he received his doctorate. From 1915 to 1955 he was director of the Norwegian Meteorological Institute. During 1935-1946, he was president of the International Meteorological Organization. In the WMO he was a member of the executive committee from 1951 to 1955. The second IMO prize was awarded posthumously to CARL-GUSTAV ROSSBY, former director of the International Meteorological Institute, Stockholm. ANDRE VIAUT, president of WMO made the presentation to MRS. HARRIET ROSSBY on April 15, 1958. In his tribute, VIAUT mentioned ROSSBY's two main interests: "scientific research on the most varied subjects connected with meteorology, and the training of young meteorologists." *Subject Headings*: 1. Awards to meteorologists 2. World Meteorological Organization 3. WMO awards 4. Hesselberg, Th. 5. Rossby, C.-G.—*I.L.D.*

ARCTIC RESEARCH

See also: Arctic synoptic and dynamic climatology (Hare, Orvig), 10.3-6; Arctic ionospheric program for IGY (Shapley), 10.3-38.

10.3-49

551.506.7(98)

*Gaigerov, S. S., *Atmosfernye protsessy v tsentral'noi Artike*. [Atmospheric processes in the Central Arctic.] *Priroda*, Moscow, 46(12):27-34, Dec. 1957. 5 figs., ref. **DLC**. Trans. into English available from Special Libraries Association Translation Center (John Crerar Library, Chicago) as its R-4020.—A detailed report on preliminary results of aerological observations of atmospheric processes made over the Central Arctic, carried out by the author-aerologist of drifting station "North Pole 4." The studies dealt with: the structure of cyclones and atmospheric fronts, the tropopause, inversion in the 1-2 km atmospheric layer, variations of the lower cloud limit height, the study of thermal regimes of the atmosphere, etc. *Subject Headings*: 1. Upper air observations 2. Atmospheric disturbances 3. Arctic air 4. Translations 5. Central Soviet Arctic.—*A.M.P.*

10.3-50

551.506.1:551.582.2(712.2)

*Canada. Meteorological Div., *Climatological summary, Mould Bay, N.W.T., Canada, May 1948-Dec. 1953*. Toronto, 1957. 92 p. almost entirely tables.—Detailed climatic data are presented for Mould Bay Weather Station, Prince Patrick Island, N.W.T., lat. 76°14'N, long. 119°20'W. The staff makes ice thickness and snow measurements, tidal observations, and surface and upper air meteorological observations. Instrumental equipment and site are described. Data include: six hourly surface data (ceiling-visibility, classified flying weather, wind, air and speed, temperature, etc.), daily (hourly) synoptic surface observations May 1948-Dec. 1953, radiosonde data for 0300 and 1500 GMT, mean Jan. and July adiabatic charts for 03 and 15h, height-temperature frequencies for 850, 700, 500, 300 mb for 03 and 15h; 1, 3, 6, 9, and 12 km upper air winds, etc. Data are reproduced in small print from IBM summaries, but are nicely bound and edited. *Subject Headings*: 1. Climatic summaries 2. Climatic data, Mould Bay, N.W.T., Canada 3. Radiosonde data 4. Aeronautical meteorological data 5. Upper air wind data 6. Mould Bay, N.W.T.—*M.R.*

10.3-51

551.506.5:91.04(98)

Novikov, Valer'ian Dmitrievich, *Iz istorii osvoeniia sovetskoï arktiki*. [History of the conquest of the Soviet Arctic.] Moscow, Gosud. Izdatvo Politicheskoi Literatury, 1956. 214 p. photos, maps (some fold.), foot-refs. DWB (919.8 N943i)—Describes certain stages of the history of the conquest of Soviet Arctic, namely: the first measures taken in 1918, the first Kara Sea expeditions in 1920-1921, the protective measures against imperialistic attempts for taking over the Soviet Arctic, the "Sibiriakov" Expedition and organization of the North Sea Route administration, the "Cheliuskin" epic, the first expedition to the North Pole region, and the drifting North Pole stations 1 to 5. This book emphasizes the political aspect of the problem, and stresses that the Party was the guiding and inspiring force of the conquest. *Subject Heading: 1. Soviet Arctic expeditions.—A.M.P.*

10.3-52

551.526.8(98)

Brewer, Max C. (*U. S. Geological Survey, Menlo Park, Calif.*), *The thermal regime of an Arctic lake*. *American Geophysical Union, Transactions*, 39(2):278-284, April 1958. 10 figs., 6 refs. DWB, DLC—Much of the Arctic coastal plain in Alaska is covered by shallow lakes. Those in the Barrow area, which are believed to be representative of most of the lakes in the coastal plain, are generally either two to three feet or six to nine feet deep. The shallow lakes can often provide a suitable summer water supply, but only the deeper lakes provide a significant water supply throughout the year. The water in the individual lakes is in an essentially isothermal state during the ice-free period that lasts from late June until Sept. The maximum temperature recorded in a lake near Barrow in 1954 was about 12°C. When ice formation begins, the temperature of the body of water as a whole may be only a few tenths of a degree above 0°C. Once the lake surface is iced over, the water temperatures may rise rapidly as much as 2°C, apparently owing to radiated heat received through the ice. The heating is terminated by a sudden cooling that coincides with the covering of the ice by a thin blanket of snow. This cooling is followed in turn by a second warming of the bottom and near-bottom water that takes place gradually over a period of weeks. The bottom sediments beneath the lake are the source of heat. The magnitude of the second rise and the time during which it takes place depend on the distance from shore and the depth of water. A gradual cooling takes place during the balance of the winter. Permafrost underlies the shallow lakes but an unfrozen basin several hundred feet deep may extend beneath the deeper lakes. *Subject Headings: 1. Thermal regime of lakes 2. Lake temperatures 3. Arctic lakes 4. Arctic 5. Barrow, Alaska.—Author's abstract.*

ANTARCTIC RESEARCH

See also: Antarctic (Fricker), 10.3-35; *Automatic weather station, Antarctica* (Kamoto et al.), 10.3-149.

10.3-53

551.515.13(99)

§Van Loon, H., *Note on the passage of lows over Antarctica*. *South Africa. Weather Bureau, Notos*, 6(1/2):13-16, 1957. 8 figs., 3 refs. DWB—The network of meteorological stations in high southern latitudes has improved substantially with the approach of the IGY and meteorologists are now better equipped than before to follow the tracks of lows close to Antarctica and to decide whether they enter the continent or not. Two cases are described by means of synoptic maps; one of a low entering eastern Wilkes Land and crossing Victoria Land to the Ross Sea, and another of a low passing over Enderby Land. It is pointed out that a persistent meridional circulation, with dynamic ridges extending far south, may favor the steering of lows into Antarctica and that this phenomenon will therefore occur preferably in areas where blocking is most common. *Subject Headings: 1. Cyclone tracking 2. Antarctic synoptic-case histories 3. Antarctica.—Author's abstract.*

10.3-54

551.524:551.581:551.311.17(99)

†Wexler, H., *Some aspects of Antarctic geophysics*. *Tellus*, Stockholm, 10(1):76-82, Feb. 1958. 6 figs., 16 refs. Discussion by Malcolm Mellor. *Ibid.*, 10(4):498-499, Nov. 1958.

DWB, DLC—This paper is concerned mostly with the Antarctic Ice Sheet—first, the time required for the ice to build up to its present mass; second, its present budget in terms of annual import and export; and third, its important role in the manufacture of cold air. The discussion will be suggestive rather than conclusive and will attempt to illustrate the need for the type of data which will be collected in the Antarctic during the IGY. *Subject Headings:* 1. Ice field effects on air temperature 2. Temperature over ice fields 3. Antarctica.—*Author's abstract.*

10.3-55

551.506.5(99) 91(99)

U. S. Office of Geography, **Geographic names of Antarctica; official standard names approved by the U. S. Board on Geographic Names.** With a foreword by Meredith F. Burrill and a List of expeditions by Kenneth J. Bertrand and Fred G. Alberts. Revised edition *U. S. Board on Geographic Names, Gazetteer* No. 14, 1956. 332 p. (First published in 1947 as *U. S. Board on Geographical Names, Special Publication*, No. 86.) **DLC, DWB** (910.3 U582g)—The huge volume contains a chronological list of 160 expeditions to the Antarctic from 1675-1955, and an alphabetical list of >3300 place names in the Antarctic, and numerous cross references from names not recommended. Each place is described as to its relative location and its coordinates, elevation above sea level and the source of the name, if known. *Subject Headings:* 1. Antarctic geography 2. Antarctic expeditions 3. Antarctica. I. Burrill, Meredith F. II. Bertrand, Kenneth J. III. Alberts, Fred G.—*M.R.*

SERVICES

See: Hydromet. service, Stalingrad (Nartysh), 10.3-91.

10.3-56

551.5:061.1(51) 551.501.9(51)

Tu, Chang-Wang (*Head of the Central Met. Inst. of China*), **Meteorologicheskaya sluzhba v Kitae.** [Meteorological Service in China.] *Narodnyi Kitai*, Peking, No. 17:8-12, Sept. 1, 1957. photos. **DLC**—Some factual information on the development of the Chinese Meteorological Service since 1949 when there were only 72 meteorological stations in the whole country. By 1956 the number of meteorological observatories and stations increased 20 times, the number of technical workers amounted to more than 10,000 and state investments for the purchase of instruments increased 30 times (over the 1950 level). Since 1956, 19 meteorological bulletins have been issued. Weather forecasts are broadcast for the whole country (which aid agriculture, and warn of approaching typhoons). However, the Chinese Met. Serv. is still very young and therefore, defective. The shortcomings will be eliminated in 2 years (according to plan) when a dense network of aerological (every 200 km), synoptic (every 100 km), climatic (every 50 km) and rain gage stations (every 20 km) will be organized. *Subject Headings:* 1. Chinese meteorological service 2. Meteorological networks 3. China.—*A.M.P.*

10.3-57

551.501.9:551.579

Nichkevich, S. N. and Blagoveshchenskii, P. P., **Rabota gidrometeorologicheskoi stantsii Rostov (Iaroslavskoi obl.).** [Work of the Rostov (Yaroslavl Oblast) Hydrometeorological Station.] *Meteorologiya i Gidrologiya*, Leningrad, No. 4:41-44, April 1957. fig. **DWB, DLC**—A detailed account of the meteorological activities at the Rostov Hydrometeorological Station, which is a first order district station. The authors describe: (1) the educational activities of the station, including instructions by correspondence in the case of the observers, library facilities, etc.; (2) procedures in recording observations; (3) control of operational data and (4) service to the public, etc. A photograph showing the working bench of an observer with the various instruments is presented. *Subject Headings:* 1. Rostov Hydrometeorological Station 2. Rostov, Yaroslavl Oblast, U.S.S.R.—*I.L.D.*

10.3-58

551.5:63:629.13(47)

Sukhov, I. M., **Opyt obsluzhivaniia sel'skokhoziaistvennoi aviatsii.** [Experience in providing service for agricultural aviation.] *Meteorologiya i Gidrologiya*, Leningrad, 7:47-48, July 1957. **DWB, DLC**—A description of the meteorological service provided to agricultural

aviation, in relation to crop dusting, selection of landing fields, special weather data such as extent of snow cover, etc. with special reference to the Stavropol District. Maps showing dew frequency are being constructed in order to increase efficiency of crop dusting; maps of dates of disappearance of snow cover in particular areas are prepared. The Stavropol area is divided into 5-7 zones each with special weather and physiographic features so that local weather conditions can be forecast more precisely, etc. *Subject Headings: 1. Agricultural aviation 2. Agrometeorological services 3. Stavropol District, U.S.S.R.—I.L.D.*

10.3-59

551.501.9:63(47)

Svisiuk, I. V., *Iz opyta raboty po agrometeorologicheskomu obsluzhivaniyu oporno-pokazatel'noi MTS.* [Experience in agrometeorological service to a model machine-tractor station.] *Meteorologiya i Gidrologiya*, Leningrad, 9:38-39, 1957. DWB, DLC—Agrometeorological stations were organized on the collectives and all the field camps of the machine tractor stations (steppe area of Stavropol) where observations of air temperature, precipitation, soil moisture, phenological signs, etc. were made. The meteorological data are distributed by the communication service of the machine tractor stations. Several examples illustrating the advantageous use of agrometeorological data in the operation of the machine tractor stations during various farming operations in 1955 are presented. *Subject Headings: 1. Agrometeorological stations 2. Stavropol District, U.S.S.R.—I.L.D.*

INSTITUTIONS AND OBSERVATORIES

See also: Soviet Acad. of Sciences (Vucinich), 10.3-16

10.3-60

551.501.9:551.43:069(237.2)

Schaefer, Vincent J., (*The Munitalp Found., Inc.*), *The museum of the atmosphere.* *Weatherwise*, Boston, 19(6):193-196, Dec., 1957. 3 photos. DWB—A "museum of the atmosphere" is being established on White Face Mt. in the Adirondacks, the only high mountain in New York state having a good auto road to the top. The museum is sponsored by the White Face Mountain Authority, a state agency, with Munitalp Foundation supplying technical guidance and is to be completed by 1960 if all goes well. The instruments installed for active use include: many rain and cloud meters, dew point meters (including one in a tunnel), moisture catch of trees, grass, bushes, etc. when nonprecipitation clouds occur. Plastic replicas of rime formations and snow crystals, photomicrographs of precipitation samples, liquid water content and drop size distribution of clouds, and time lapse pictures of clouds made automatically are displayed. Eight temp., 4 pressure, many optical, radiative, electrical, cosmic ray, wind and aerosol, astronomical, geological and other working models of meteorological phenomena as laboratory equipment will be included. *Subject Headings: 1. Mountain observatories 2. Meteorological museums 3. White Face Mt., New York.—M.R.*

10.3-61

523.7 551.501.9:551.43

Roberts, Walter Orr (*High Altitude Obs., Univ. Colorado, Boulder and Climax, Col.*), *A high altitude solar research station.* *Weatherwise*, Boston, 9(5):155-157, 177, Oct. 1956. 3 photos. DWB—Personal recollections of the first director of the High Altitude Observatory at Climax, Colo., established by DONALD H. MENZEL (present Director of Harvard Observatory) in 1940. The coronagraph, to get daily records of the sun's corona, is the main feature of the observatory. Good weather for observing the corona occurs on 60% of the days and excellent conditions for an hour or so on about 10-15% of the days. Dust, wind, forest fires from NW, and cirrus layers are the worst drawbacks. Snow often gets 12 ft deep from mid-Oct. to early June. Photographs of the site and the sun's corona, and one of an eruptive prominence obtained at Climax are included. *Subject Headings: 1. High altitude research stations 2. Astrophysical observatories 3. Solar corona 4. Climax, Colo.—M.R.*

10.3-62

523.7:061.6(45)

Abetti, Giorgio (*Astrophysical Obs., Arcetri, Florence*), *Thirty years of solar work at Arcetri.* (In: Beer, Arthur (ed.), *Vistas in astronomy.* London, Pergamon Press, 1955. Vol. 1:624-630. 2 figs.) DLC (QB3.B35)—A short review is given of the solar work done at the Astrophysical Observatory in Arcetri from 1922 to 1952. The motions and behavior

of bright flocculi and dark filaments have been investigated. Flare intensities have been determined, and compared with those determined by other observatories. Systematic measures of the height of the chromosphere and of the solar rotation have been made. Researches on the curve of growth, abundance of elements, equivalent width of the spectral lines, motion of gases in sunspots, and other topics, have been included in the program of work. *Subject Headings:* 1. Solar research 2. Arcetri Astrophysical Observatory 3. Astrophysics 4. Arcetri Observatory, Florence, Italy.—*Author's abstract.*

CONFERENCES AND SYMPOSIA

See: Planetary atmospheres (Davies), 10.3-180; Atmospheric chemistry (Neumann), 10.3-183; Conference at Central Geophys. Obs. (Gandin et al.), 10.3-315; Soil physics, 10C-47; Soil moisture, 10C-76.

EDUCATION, HISTORY AND BIOGRAPHY

BIOGRAPHY

10.3-63

551.311.1:92

[Obituary of] Richard Carleton Hubley. *American Meteorological Society, Bulletin*, 38(9):553, Nov. 1957. photo. DWB, DLC—A brief biographical sketch of RICHARD CARLETON HUBLEY (1926-1957), an account of his scientific work and a photograph are presented. DR. HUBLEY was a glaciologist with special interest in the heat budget of glaciers. *Subject Headings:* 1. Obituaries 2. Hubley, R. C.—*M.R.*

10.3-64

551.5:92

[Obituary note on] Gabriel Bagratovich Matinian. *Meteorologiya i Gidrologiya*, Leningrad, No. 10:55, Oct. 1957. DWB, DLC—G. B. MATINIAN, was born Sept. 20, 1906 and died Sept. 27, 1957. A brief account is given of his scientific education and his activities in the field of meteorology. These were primarily administrative and educational. Since 1949 he had been Director of the Department of Scientific Investigation Establishments of the Hydrometeorological Service of the U.S.S.R. *Subject Headings:* 1. Obituaries 2. Matinian, Gabriel Bagratovich.—*I.L.D.*

10.3-65

551.46:92

[Obituary of] Grigorii Ivanovich Shamov [by a group of colleagues]. *Meteorologiya i Gidrologiya*, No. 11:58, Nov. 1956. fig. DWB, DLC—On Oct. 3, 1956 G. I. SHAMOV died at the age of 65. He was director of the laboratory of alluvial studies and hydrochemistry of the State Hydrological Institute of the Red Banner and a foremost specialist on the formation of river channels and the transport of alluvium. A summary of his scientific activities is given. *Subject Headings:* 1. Obituaries. I. Shamov, Grigorii Ivanovich.—*I.L.D.*

10.3-66

551.5:92

[Obituary notice of] Andrei Andreevich Trufanov. *Meteorologiya i Gidrologiya*, Leningrad, No. 6:62-63, June 1957. port. DWB—The hydrologist, A. A. TRUFANOV, died at the age of 67 on March 22, 1957. While professor at the Kazan Polytechnical Institute, he wrote the first Soviet textbook on river hydrology. In recent years he was interested primarily in the investigation and improvement of waterways communications. He was director of the Volga-Kama Waterways Experimental Station, and assisted in the formulation of the State Plan of the Tatar U.S.S.R. Since 1936 he was head of the department of hydrology of the Kazan Chemical Technology Institute. *Subject Headings:* 1. Obituaries 2. Trufanov, Andrei Andreevich.—*I.L.D.*

BIBLIOGRAPHY

10.3-67

551.582.1(673):016

†Ferreira, H. Amorim, *Bibliografia meteorológica e geofísica de Angola*. [Meteorological and geophysical bibliography of Angola.] Luanda, Serviço Meteorológico, 1957 (1958 on

cover). 14 p. "Revision of first ed, 1955." (See 8.4-52, April 1957, *MAB.*) DWB (M(016) A592b)—This revised bibliography contains 59 references on general meteorology of Equatorial Africa, 96 references on climate of Angola, 11 on "geophysics" and 5 on seismology of the region. Entries are arranged alphabetically by author in each section and cover the period from 1862-1957. *Subject Headings:* 1. Bibliography on climate of Angola 2. Angola.—*M.R.*

10.3-68

551.501.81:551.577.2:016

†U. S. Weather Bureau, *Bibliography (on) Areal precipitation measurements by radar.* (1955?) unpag. DWB (M08.85)—About 60 unannotated references to U. S. and Canadian literature (1945-1954) on quantitative measurement of precipitation by radar, arranged alphabetically by author. *Subject Headings:* 1. Radar precipitation measurement bibliographies 2. Areal precipitation measurement.—*M.R.*

10.3-69

612.275.11:016

Aviation medicine: an Annotated Bibliography, 1952. Issued Wash., D. C., Technical Information Div. [of] Library of Congress, Nov. 1956. Comp. by Arnold J. Jacobius and Madeleine J. Wilkins. 204 p. "First annual cumulation of the bibliography of Aviation Medicine prepared under Government Order NA-onr-211-56, by Technical Information Div. of the Library of Congress." Items arranged alphabetically by author. Subject index. Corporate author index (of bodies which issued reports). DLC—Over 1000 abstracts are arranged alphabetically by author and year of publication (1952). Material consists of periodical literature, books, and reports. Abstracts are informative, indexes (author, corporate author and subject) are provided and availability of the copy used indicated. Some of the pertinent subjects are: altitude acclimatization and effects, anoxia, pressure effects, cold, cosmic rays, heat loss, vision, wind effects and weather effects. *Subject Headings:* 1. Aviation medicine bibliographies 2. Altitude effects. I. Jacobius, Arnold J. (comp.) II. Wilkins, Madeleine, J. (comp.) III. U. S. Library of Congress. Technical Information Div.—*M.R.*

10.3-70

551.582.3(72):016

Saltsman, Edgar Joseph, *Selective annotated bibliography on climatic maps of Mexico.* Wash., D. C., U. S. Weather Bureau, [1957?] 15 p. 48 items. Photostat of typescript. DWB (M(016) U587sa)—Annotated references to climatic maps of Mexico are arranged chronologically (1920-1956) and indexed by author, subject and map scale. *Subject Headings:* 1. Climatic charts of Mexico 2. Bibliography on climatic charts of Mexico 3. Mexico.—*M.R.*

PRACTICAL AND APPLIED METEOROLOGY

MARINE METEOROLOGY AND OCEANOGRAPHY

See also: Sailing directions, German North Sea Coast, 10.3-27.

10.3-71

551.461

*Japan. Meteorological Agency, Tokyo, *Oceanographical Report*, Vol. 6, No. 4, Dec. 1957. 253 p. figs., tables. In Japanese; English summaries. DWB—This series of detailed oceanographic studies gives in tables, cross sections, isopleth charts and graphs, an analysis of temperature, chlorinity, plankton, current velocity, dissolved oxygen and phosphate conditions in the particular areas mentioned in titles: Report of the oceanographic observations in: 1). Okhotsk Sea in April, 1957; 2) Sea east of Tōhoku District in May, 1957; 3) Sea east of Tōhoku District and the Okhotsk Sea from Aug. to Sept., 1957; 4) Sea east of Honshu in May, 1957; 5) Sea east of Honshu from Aug. to Sept. 1957; 6) Sea south of Honshu in May, 1957; 7), Sea south of Honshu in Aug., 1957; 8) Seas west of Japan from Aug. to Sept., 1957; 9) Sea north off Kyoga-misaki and off the east part of San in District in April-June, 1957; 10) Sea north of San in and Hokuriku Districts in Aug., 1957; 11) Report of multiple ship survey in the polar front region from June to July, 1957 (Oceanographic Project for the IGY). *Subject Headings:* 1. Oceanographic surveys 2. Japanese seas.—*M.R.*

10.3-72

551.526.6:551.524:551.465

Byzova, N. L., **Formirovanie temperatury vozdukhha nad morem pri nalichii v nem techenii.** [Formation of air temperature over the sea in the presence of sea currents.] *Akademii Nauk SSSR. Morskoi Gidrofizicheskii Institut, Trudy*, 7:126-132, 1956. 4 figs., 6 refs., 5 eqs. **DLC**—The theory of the formation of air temperature over a sea is developed by the author, whereby the formation of temperature is influenced not only by the peculiarity of the heat properties of water but mainly by the warm and cold sea currents which, in conveying water of a certain temperature into the investigated area of the sea, play the role of sources, or absorbers, of heat. *Subject Headings*: 1. Sea current effects on air temperatures 2. Heat exchange sea-atmosphere.—*A.M.P.*

10.3-73

551.501.4:551.55:551.511.2(26)

Drogaitsev, D. A., **Raschet zavikhrennosti kasatel'nogo treniia vetra nad morem.** [Calculation of the vorticity of tangential friction of wind over the sea.] *Meteorologiya i Gidrologiya*, Leningrad, No. 5:15-21, Sept./Oct. 1955. 4 figs., table, 3 refs., 13 eqs. **DWB, DLC**. Trans. into English available. **DWB** (M01.4 D784c)—The author proposes two procedures for calculating the vorticity of the tangent friction of wind over sea. A formula is developed giving the average vorticity for each of the principal squares into which the sea surface was originally subdivided and another formula for squares that are equal in area but displaced relatively to one another in such a way that their vertices coincided with the centers of the principal squares. They are, respectively,

$$\cot \tau = \frac{5.55 \times 10^{-7} \gamma^2 \rho}{S} (-l_1 E_1 - l_2 N_2 + l_3 E_3 + l_4 N_4)$$

and

$$\cot \tau = 4.5 \times 10^{-8} \gamma^2 \rho \left(\frac{N_1 - N_2 - N_3 + N_4}{\rho \cos \gamma} - \frac{E_1 + E_2 - E_3 - E_4}{g} \right) \text{ dyn/cm}^2.$$

Subject Headings: 1. Wind computations at sea 2. Vorticity computations.—*I.L.D.*

10.3-74

551.46:681.177

Isiguro, Shizuwo and Fujiki, Akimitsu, **An analytical method for the oscillations of water in a bay or lake, using an electric network and an electronic analogue computer.** *Oceanographical Society of Japan, Tokyo, Journal*, 11 (4):191-197, 1955. 8 figs., table, 6 refs. **DWB**. Also reprinted as: *Oceanography and Meteorology*, Nagasaki, Japan, 7(1/4):Paper No. 4, June 1956.—A new method has been described for the analysis of transient phenomena of a hydrodynamic system having a free surface, taking the case of the Bay of Nagasaki as an example. The main operation of the analysis was carried out by an electric network being analogous to the hydrodynamic system and by an electronic analogue computer designed for this purpose. In this method, some newly designed techniques for the hydraulic experiments have been used to determine the constants of the above network, and these techniques themselves may be applied independently to the general hydraulic experiments. *Subject Headings*: 1. Analogue computers 2. Water oscillation measurement.—*Authors' abstract.*

GLACIOLOGY

10.3-75

551.311.17(988)

*Wallerstein, George, (Astronomy Dept., Calif. Inst. of Tech., Pasadena), **Movement observations on the Greenland Ice Sheet.** *Journal of Glaciology*, London, 3(23):207-210, March 1958. fig., 2 tables, 5 refs. English and German summaries p. 207. **DWB, DLC**—During the summer of 1955 certain positions on the Greenland Ice Sheet that had been established by the French in 1951 were redetermined by observations of the sun in order to measure the motion of the surface of the ice sheet. A motion of 774 m in four years in a southerly direction was noted at the Central Station. A motion of 611 m in a westerly direction was noted at the French Mile 100. The uncertainty of the measures is large when the time scale is as short as four years, and expeditions to this area are urged to remeasure these positions and extend the markers for future use. *Subject Headings*: 1. Greenland Ice Cap 2. Glacier movement 3. Greenland.—*Author's abstract.*

10.3-76

551.311.17(99)

Weinman, James A. (*Dept. of Physics, Univ. of Wisconsin*), **Ice shelf oscillations.** *Journal of Glaciology*, London, 3(23):187, March 1958. ref., eqs. DWB, DLC—Gravity measurements on the Filchner Ice Shelf during summer of 1956-7 show that the shelf is oscillating. This introduces a possible error of 0.5 milligal in the gravity measurements. From simple calculations the place where the shelf is anchored could be predicted, or the existence of islands under the shelf determined. Also the location where calving would take place could be predicted and the information used in establishing lease sites on shelf ice. *Subject Headings:* 1. Shelf ice oscillations 2. Calving forecasts 3. Filchner Ice Shelf, Antarctica.—M.R.

10.3-77

551.311.13(47)

Zagorskaia, N. G., **Sovremennoe oledenie arhipelaga Severnoi Zemli.** [Present glaciation of the Severnaya Zemlya Archipelago.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 89(6):508-515, 1957. chart (fold.). DLC—The contemporary glaciation of the Severnaya Zemlya Archipelago is described on the basis of data collected by several expeditions between 1948-1951 and published in his **Geomorfologiya i chetvertichnye otlozheniia arhipelaga Severnoi Zemli** [Geomorphology and quaternary deposits of the Severnaya Zemlya Archipelago]. The relief of the inlands of this archipelago is divided into three fundamental levels: the glacial plateau, the internal plain and the coastal plain. On this generally flat base lies the foundation of ice sheets. The total area of the present glaciation of this archipelago constitutes 16,908 km². The ice sheets are classified and a specific description is given of a glacial dome. In general, the large masses of ice lying upon flat planes of the archipelago are practically passive and the most important factors in the formation of deposits in the zone of glaciation are first of all water and secondly solifluction and nivation processes. A schematic geomorphologic map of the archipelago is included. *Subject Headings:* 1. Glaciation in U.S.S.R. 2. Severnaya Zemlya Archipelago.—I.L.D.

10.3-78

551.583.2:551.311.13/6(00)

†West, R. G., (*Botany School, Univ. of Cambridge*), **The Pleistocene epoch in East Anglia.** *Journal of Glaciology*, London, 3(23):211-216, March 1958. fig., table, 26 refs. English and German summaries p. 211. DWB, DLC—The sequence of Pleistocene deposits in East Anglia is tabulated. The following aspects of the Pleistocene are discussed and summarized: boundaries of the Pleistocene, glacial and preglacial, ice advances, interglacials, glaciations, marine horizons, climate and periglacial features. Correlations are given between the Pleistocene deposits of East Anglia and the continent. *Subject Headings:* 1. Pleistocene deposits 2. Glaciology 3. East Anglia.—Author's abstract.

10.3-79

551.583.2:551.311.12

†Czajka, Willi (*Göttingen*), **Die Reichweite der Pleistozänen Vereisung Patagoniens.** [Extent of pleistocene glaciation in Patagonia.] *Geologische Rundschau*, Stuttgart, 45(3):634-686, 1957. 24 figs., plate, bibliog. p. 683-686. English, French, Spanish and Portuguese summaries p. 936, 941, 946 and 952. DLC (GE1.G4917)—In this detailed geological paper, the climatic zonation in different sectors of Patagonia is discussed and illustrated. The references cited on pleistocene glaciation and periglacial phenomena are numerous. *Subject Headings:* 1. Pleistocene glaciation 2. Patagonia.—M.R.

ASTRONAUTICS—SATELLITE OBSERVATORIES

See: Satellite and rocket observations (Fedorov), 10.3-132; Satellite orbits (Nonweiler), 10.3-133; see also Astrophysics, p. 355-360.

AERONAUTICAL METEOROLOGY

See also: Contrail forecasting, 10.3-29; Aviation medicine bibliog., 10.3-69; Air-borne weather radar and turbulence in flight (Balzer), 10.3-150.

10.3-80

551.513.2:551.557.5:629.135.2

Reiter, Elmar R. (*Chicago Univ.*), **Jet stream and jet aircraft operations.** *Navigation*, Los Angeles, 5(6):267-278, Summer 1957. 15 figs., 3 refs., 4 eqs. DWB, DLC—Vertical and

horizontal wind shears greatly effect the efficiency of jet aircraft. They are used for determining the optimum cruise for the maximum ratio of air distance to the fuel consumed, as well as for determining the minimum flight path. The author plots various graphs for airspeeds, fuel consumption, layers of winds and jet stream axis. *Subject Headings: 1. Jet aircraft operation 2. Jet stream.*—*N.N.*

10.3-81

551.5:629.13.035

†U. S. National Advisory Committee for Aeronautics, **Meteorological problems associated with commercial turbo jet-aircraft operation, by a Working Group of the NACA Subcommittee on Meteorological Problems.** Its *Research Memorandum* 54L29, June 21, 1955. 46 p. 17 refs., bibliog. p. 44-46. (620.1308 U585rm) **DWB**—Meteorological requirements and problems anticipated with the safe, efficient, and economical operation of commercial turbojet aircraft have been analyzed and evaluated. Problems of temperature, wind, pressure, ceiling, visibility, cloud and clear-air turbulence, icing, and communication are discussed. Characteristics such as high cruising speed, high cruise level, relatively high fuel consumption, and engine performance sensitive to temperature and air density are considered. *Subject Headings: 1. Aeronautical meteorology 2. Jet aircraft operation.*—*NACA.*

10.3-82

551.509.31:551.515.5:629.13(66)

§Renard, J. and Casanova, H., **Une situation classique en novembre-décembre sur le trajet Dakar-Abidjan.** [Classic situation of November-December on the Dakar-Abidjan route.] *France. Météorologie Nationale, Monographies*, No. 6, Oct. 1957. 27 p. 29 figs. **DWB**—A detailed analysis of a typical Nov./Dec. synoptic situation (polar outbreak and stationary depression) on the Dakar-Abidjan air route, which occurred on Nov. 29, 1955. Surface, upper air, antecedent weather, forecasts for going and returning flights, winds aloft forecast, weather observed en route, discussion of accuracy of forecast made by Dakar cloud photos made en route and sample surface, 500 m above surface and 850, 700, 500 mb charts for 27-29 Nov. 1955, plus flight plans, cross sections and radiosonde charts are included. *Subject Headings: 1. Synoptic case history studies 2. Air route forecast studies 3. Dakar-Abidjan air route.*—*M.R.*

10.3-83

551.506.1:629.135(712)

Page, F. A. (*Met. Div., Dept. of Transport, Canada*), **All is not snow and ice in the Yukon.** *Weather*, London, 13(4):128-130, April 1958. photo. **DWB**—Operational weather charts prepared each month at Canadian airports show periods of bad weather as black areas, intermediate types of flying weather as crosses, and good weather as clean areas. One month (June 1957), a completely clean chart was submitted by Whitehorse, Yukon Territory, indicating a month of perfect flying weather, and a punch card check showed no hour of <3000 ft ceiling or <10 mi visibility, and only 6 hrs with 3-8000 ft ceiling and 10-15 mi visibility. A record for Gander Airport for the same month is reproduced to show how the system operates. It presents a much darker picture. *Subject Headings: 1. Flying weather charts 2. Whitehorse Yukon Territory 3. Gander, Newfoundland.*—*M.R.*

AGRICULTURAL METEOROLOGY

See also: *Agroclimatic and water resources, U.S.S.R., 10.3-10; Agricultural aviation, Stavropol District, U.S.S.R. (Sukhov), 10.3-58; Agromet. stations, Stavropol District, U.S.S.R. (Svisiuk), 10.3-59; bibliog. on Soil Moisture, p. 423.*

10.3-84

551.552:631.67

Navrotskaia, V. S. and Raevskii, A. N., **Osobennosti rezhima vetra nad oroshaemym polem v usloviakh iuga Ukrainy.** [Characteristics of the wind regime over an irrigated field under conditions in the southern Ukraine.] *Meteorologiya i Gidrologiya*, Leningrad, No. 8:35-38, 1957. 2 figs., 2 tables, 2 refs. **DLC, DWB**—The wind regime in the layer of the atmosphere near the ground was studied during the summer of 1955 in Odessa Oblast (Stalin State Farm near Gradenitz). Observations were carried out from June 11 to July 18, during which period the rice field was irrigated only once, since rainfall was frequent. Wind velocity was measured every two hours around the clock, at 15 cm, 1 m and 2 m. Data are presented in tables and graphs on the daily variation of wind velocity on rice and tomato fields up to irriga-

tion, on the day of irrigation and on the seventh day after irrigation; at heights of 0.15 m, 1 m and 2 m; on the differences in wind velocity between irrigated fields of rice and non-irrigated tomato fields on individual days before and after irrigation; on the vertical profile of temperature in a rice and tomato field on the day of irrigation; and on the differences in wind velocity on rice and tomato fields on the day when the rice field was irrigated. It is shown that irrigation substantially influences the wind regime in the layer near the ground in that the irrigated portions show a sharply reduced wind velocity. On the day of irrigation, the wind velocity at 2 m above the irrigated field was only 50% of the velocity on the non-irrigated field. The cause of this decrease in wind velocity is the increased stable stratification of the ground layer of the atmosphere because of the large heat loss by evaporation from the moist soil surface and plants. *Subject Headings: 1. Wind regime 2. Irrigation effects on wind velocities 3. South Ukraine.—I.L.D.*

10.3-85

551.571:633.15

Savzdarg, S. F., *O vilianii vlagi na formirovanie pochatka kukuruzy*. [Influence of moisture on the formation of ears of maize.] *Meteorologiya i Gidrologiya*, Leningrad, No. 4:31-32, April 1957. fig., table, 2 refs. DWB, DLC—For 22 meteorological stations located in different climatic zones of the U.S.S.R., the author investigated the relationships between moisture supplies and growth of ears of maize as indicated by the number of kernels in an ear. Data on the moisture resources during the 20-day period (10 days before tasseling to 10 days after tasseling) and the number of kernels in an ear are presented in a table. A linear relationship exists between number of kernels and total moisture supply (moisture supply at beginning of period (mm) and precipitation during period (mm)). In order to forecast the number of kernels in an ear, it is necessary to know the date of tasseling, moisture supply at beginning of period and total precipitation for 20 days. The accuracy of the prediction is discussed with the aid of specific examples. *Subject Headings: 1. Moisture effects on maize 2. Maize phenology.—I.L.D.*

10.3-86

551.506.8:551.524:633.15(477)

Shigolev, A. A., *Ob opredelenii termicheskikh pokazatelei skorosti razvitiia kukuruzy*. [Determination of thermal indexes of the speed of development of maize.] *Moscow. Tsentral'nyi Institut Prognozov, Trudy*, No. 47(74):51-58, 1956. 11 figs., 8 tables, 10 refs. DLC—A paper in which the author presents some consideration of the methods of determining these thermal indexes. Since maize is rarely cultivated in regions other than southern European U.S.S.R., there is an important lack of factual data on the growing of maize, and effective temperature sums are the only criteria as yet. *Subject Headings: 1. Maize phenology 2. Temperature effects on maize 3. Ukrainian S.S.R.—A.M.P.*

10.3-87

551.556.2:551.515.2:633.18

Kawamata, M.; Tsutkijima, Y. and Sato, T. (all, *Kanoya Farm, Div. of Kagoshima Prefectural agricultural experiment station*), *On the effects of shelter-hedge, tiled round by sweet potato stems, for upland rice against typhoon*. *Journal of Agricultural Meteorology*, Tokyo, 12(4):128-130, March 1957. 2 figs., 3 tables, 5 refs. In Japanese; English summary p. 130. DWB—The experiment on the effect of shelter-belts for the protection of upland rice against typhoons was carried out during the summer of 1955. The hedge was 250 cm high and was made from wood tiled round by sweet potato stems, and the screening ratio was 80%. The results were as follows: (1) The half velocity zone reached at about 7 times the hedge height. (2) At the above zone, the soil temperature was a little higher than at the standard zone and the yield was also superior. *Subject Headings: 1. Shelter belt effects 2. Rice paddy protection from typhoon winds 3. Rice.—Authors' abstract.*

10.3-88

551.506.8:63(02)

Orlov, V. M. and Zavalishin, V. A., *O nedostatkakh agrometeorologicheskikh rukovodstv i instruktsii*. [Deficiencies in agrometeorological manuals and instructions.] *Meteorologiya i Gidrologiya*, Leningrad, No. 3:65-66, March 1957. DWB, DLC—The authors list various obscurities and defects occurring in agroclimatic handbooks and instructions. There is a lack of agreement between the *Handbook of Agroclimatic Observations* (1951) and *Instructions for the Composition of Decadal And Daily Agroclimatic Telegrams*. With regard to pheno-

logical observations on winter crops and perennial grasses, the instructions do not provide for indices coding phenological phenomena and the various developmental stages of plants are not clearly described. *Subject Headings:* 1. Agrometeorological manual deficiencies 2. Phenological observation instructions.—I.L.D.

FOREST METEOROLOGY

10.3-89

551.588.6 551.584.1(431.9)

Wagner, Richárd, *Az erdő klímájáról*. [Climate of forests.] *Időjárás*, Budapest, 61(2):117-125, March/April, 1957. 3 figs. 17 refs. German summary p. 117. **DLC**—Both aspects of forest climatology: forest climate (i.e., climatic conditions under which forests can exist) and climates of forests (i.e., the microclimatic conditions which develop inside a forest) are discussed with emphasis on the latter aspect. Original data obtained in Hungary on horizontal and vertical temperature distribution and variations in various types of forests are presented graphically and discussed. General characteristics of forest microclimates are summed up as follows: reduced wind and sunshines, less variable air and soil temperature, less precipitation, specific forms of microprecipitation, higher humidity and lower evaporation. Forests also modify the microclimate of the surrounding environment but they cannot change the general climate. *Subject Headings:* 1. Forest climatology 2. Forest microclimates 3. Hungary.—G.T.

10.3-90

551.594.22:551.509.616:632.187

†Barrows, J. S. et al., **Project Skyfire**. (In: U. S. Advisory Committee on Weather Control, **Final Report**, 1957. 2:105-125. 20 figs., 4 tables, 19 refs.) **DWB, DLC**—The results of experiments carried out to suppress lightning fires in forests by using cloud modification, either to prevent or reduce the severity of fires, are presented in this comprehensive report. The contents of this study are as follows: the lightning fire problem in American forests; the organization of the research program of "Operation Skyfire"; a discussion of the theoretical aspects of lightning suppression, including a consideration of the apparent meteorological processes involved in thunderstorm electrification; the relationship between thunderstorms and cloud seeding and possible methods of lightning suppression; the procedure and results of the cloud and lightning survey carried out prior to the experimentation with cloud seeding (network of lookout stations, cloud breeding areas, lightning storm paths and types); description of the procedures and results of preliminary cloud seeding research carried out in Arizona in 1956, and Northern Rockies in 1956; and a detailed account of the 1957 Project Skyfire Cloud Seeding Experiment carried out on the Lolo National Forest southwest of Missoula, Mont. is presented. The results of the seeding are as follows: glaciation occurred in both small and towering cumulus clouds whenever the clouds were colder than -4°C and the AgI crystals entered the cloud. The growth rate and structure of towering cumulus with major portions below -4°C were altered; virga appeared, precipitation was produced and in isolated instances lightning occurred. The life and concentration of AgI was analyzed. Data on lightning occurrence in 1957, Project Skyfire test area, a summary of the seeding operations of this project, numerous photographs of cloud phenomena, equipment procedure, etc. are presented. *Subject Headings:* 1. Project Skyfire 2. Forest fire control 3. Lightning fires 4. Cloud seeding.—I.L.D.

INDUSTRIAL METEOROLOGY

See also: Wind power and generators (Mezentsev), 10.3-33.

10.3-91

551.509.329:621.311.21

Nartysh, N. A., **Gidrometeorologicheskoe obsluzhivanie stroitel'stva Stalingradskoi gidroelektrostantsii**. [Hydrometeorological service during construction of the Stalingrad Hydroelectric Station.] *Meteorologiya i Gidrologiya*, Leningrad, No. 3:54-56, March 1957. **DWB, DLC**—In order to provide better weather forecasts for the construction operations of the Stalingrad Hydroelectric Station, the various organizations involved in the construction were acquainted with the problems of weather forecasting and the meteorologists and other

specialists were in time familiarized with the construction procedures and problems. A detailed description is given of the type of forecasts provided during the construction period. These included general 24-28 hour forecasts, special temperature forecasts for concrete pouring, hydrological forecasts on river freezing and break up, etc. *Subject Headings: 1. Weather forecasts for hydroelectric construction 2. Hydroelectric power stations 3. Stalingrad, U.S.S.R.—I.L.D.*

10.3-92

551.58:72

Fry, Maxwell and Drew, Jane, **Tropical architecture in the humid zone.** N. Y., Reinhold, 1956. 320 p. 342 figs. (incl. photos). DWB—A comprehensive treatise on the design and construction of private and public housing, communal structures, etc. for the hot humid tropics, with special reference to the specific needs of the Latin inhabitants of the tropics, climatic adaptation of dwelling to the demands of a hot humid climate, and the local building materials and methods. The author begins with a discussion of the characteristics of hot humid climates, their geographical distribution (illustrated with maps), the general aspects of heat loss and heat gain by the human body and the general design of houses and layout of communities to obtain the maximum benefits of natural cooling of homes. This is followed by detailed chapters on the construction, etc. of the individual house; housing and town planning; shops, markets and commercial developments; educational buildings, hospitals, etc. The volume is richly illustrated with photographs and diagrams. Several appendices comprise the following: list of principal building research centers; sun data for the tropics (sun path diagrams, glare, etc.); notes on the danger of building in hurricane areas, protection of buildings against lightning, water collection and supply in the tropics; the performances of building materials in the tropics; thermal movement and building insulation in West Africa, air conditioning and the architect; the exclusion of solar heat from buildings with a special glass; protection of buildings against termites; planting in the humid tropics, etc. *Subject Headings: 1. Tropical housing 2. Building design 3. Architectural climatology.—I.L.D.*

10.3-93

551.509.53:551.524.36:622.24

Sweeney, W. J. (*Esso Res. and Eng. Co., N. Y.*), **Importance and need of degree-day forecasting for the petroleum industry.** *Weatherwise*, Boston, 10(6):197-201, 214, Dec. 1957. 4 figs., 2 tables. DWB—Uncertainties of the weather factor in planning petroleum industry operations are reduced by use of degree-day forecasts. Graphs and tables show how reserves and risks can be optimized and the economic advantages gained from good forecasts. *Subject Headings: 1. Petroleum industry 2. Degree-day forecasts for industry 3. Industrial meteorology.—M.R.*

10.3-94

551.5:77

Schmidt-Lamberg, H., **Photographie und Wetter.** [Photography and weather.] *Meteorologische Rundschau*, Berlin, 10(5):172-173, Sept./Oct. 1957. DWB, DLC—The author maintains that weather influences the quality of photographs by influencing the mood and well-being of the photographer and that of his living subject. Fall and spring with their mild days stimulate the photographer to seek suitable subjects to photograph more than does a warm or hot summer. Family photographs appear completely altered when taken in May and Dec. Inanimate objects, buildings for example, have different appearances when photographed under diverse weather conditions. *Subject Headings: 1. Weather effects on photography 2. Photography.—I.L.D.*

MEDICAL METEOROLOGY

See: Aviation medicine bibliog., 10.3-69.

ASTROPHYSICS

10.3-95

523.74/5

Kiepenheuer, K. O. (*Fraunhofer Inst., Freiburg i.B., Germany*), **Some problems of the international solar survey.** (In: Beer, Arthur (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:631-636. 4 figs., 18 refs.) DLC (QB3.B35)—The observation and

measurement of various solar phenomena are critically reviewed. The relative sunspot numbers are not purely a solar measure but are strongly affected by the earth's heliocentric position. Reduction to standard conditions is shown to be possible. The survey of faculae, flares, and prominences (filaments), still unsatisfactory, will be greatly improved by the world-wide use of the Lyot filter with automatic cameras and by the application of photoelectric photometry. Also, the daily photometry of the corona, at present mostly made visually, will gain in accuracy and in observing days per year by the use of a photoelectric method as proposed recently by LYOT. Solar magnetic fields in spots and outside the spot-belts will be important components of future solar surveys, suitable instruments already being available. The survey of the sun's radio emission is already fairly complete. The intensity of solar radiation in the far ultraviolet as revealed daily by the measurable ionospheric electron densities could be obtained on an absolute scale by calibration through a few direct rocket measurements at heights above 100 km. The corpuscular radiation of the sun is strongly disturbed in the vicinity of the earth. Terrestrial observations therefore give no reliable solar measure. It seems as if better results can be obtained by observing the effects of this radiation on comet tails and on the brightness of the zodiacal light. *Subject Heading: 1. Solar phenomena.*—*Author's abstract.*

10.3-96

523.75

Treanor, P. J. (*Univ. Obs., Oxford*), **Techniques interférométriques dans l'observation solaire.** [Interferometric techniques in solar observation.] *Journal de Physique et le Radium*, Paris, 19(3):260-261, March 1958. 5 refs. French and English summaries p. 260. **DLC**—Problems involved by the use of Fabry-Perot interferometer in solar spectroscopy are reviewed; application to the chromosphere is emphasized. Difficulties here arise from the fact that the chromosphere is an extremely narrow and relatively faint layer, some 10 sec of arc in breadth, bordering the extremely bright and scintillating solar limb. The presence of a heavy scatter spectrum creates difficulties analogous to those encountered in photospheric interferometry and overcome in a similar way. Fringe systems of $H\alpha$, $H\beta$, D_3 and H and K calcium lines were obtained, and the profile of the He line λ 5876 Å was studied with an effective resolving power of 10^5 . A small Hilger spectrograph with a very narrow slit was used in series with a Fabry-Perot etalon. The slit was placed tangentially to the solar limb; the resulting stitch-like fringes, crossing the whole of the chromosphere, contain a complete account of the variation of the profile with height. Relatively simple methods have been developed for the accurate photometry analysis and interpretation of this type of fringe system, and these may prove of interest in the interferometric observation of the other nonuniform sources. *Subject Headings: 1. Interferometers 2. Solar spectroscopy 3. Chromosphere.*—*Author's abstract.*

10.3-97

523.75

Friedman, Herbert; Chubb, T. A.; Kupperian, J. E., Jr.; Kreplin, R. W. and Lindsay, J. C. (*U. S. Naval Research Lab., Wash., D. C.*), **X-ray and ultraviolet emission of solar flares (IGY project 10.3).** *Annales de Géophysique*, Paris, 14(2):232-235, April/June 1958. 2 refs. **DLC.** Also in: *International Geophysical Year, 1957/1958. IGY World Data Center A, IGY Rocket Report Series*, No. 1:179-182, July 30, 1958. table. **DWB** (M07.362 H237ex)—First results of rockets measurements made on X or u.v. emissions of chromosphere eruptions. *Subject Headings: 1. Solar flare emissions 2. Chromosphere eruptions.*—*Authors' abstract.*

10.3-98

621.396.8:523.75

Loughhead, R. E.; Roberts, J. A., and McCabe, Marie K., **The association of solar radio bursts of spectral type III with chromospheric flares.** *Australian Journal of Physics*, Melbourne, 10(4):483-490, Dec. 1957. 3 figs. (4 plates), 10 refs. **DLC**—The relationship of radio bursts of spectral type III to solar flares is investigated by comparing simultaneous optical and radio observations. Over 300 flares are examined, 85% of which are microflares (class 1—). About 20% of the flares are associated with type III events, while more than 60% of the bursts recorded occur during the lifetime of a flare. These bursts tend to occur near the beginning of the flare or even to precede it slightly. The degree of association varies markedly over a period of days. Flares occurring in certain activity regions show a high degree of correlation with bursts, while those occurring in other regions show little or no

correlation. The probability of a burst accompanying a flare is greater for larger flares. It is essentially the same for flares on the eastern limb as for flares in the centre of the disk, implying a wide cone of escape for type III radiation. There is an apparent deficit for flares on the Western Hemisphere. The occurrence of a surge with a flare appears to increase somewhat the likelihood of an associated radio event. *Subject Headings: 1. Radio noise bursts—solar flare relationships 2. Solar flares.—Authors' abstract.*

10.3-99

523.7:061.6

Severnyĭ, Andreĭ Borisovich (*Crimean Astrophys. Obs., Simeis, Crimea*), **Investigation of flares and prominences at the Crimean Astrophysical Observatory.** (In: Beer, Arthur (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:701-703. 12 refs.) **DLC** (QB3.B35)—A survey is given of some of the results obtained at the Crimean Observatory during the past five years, referring to the hydrogen spectrum of flares, the development of prominences and flares, and allied problems. *Subject Headings: 1. Solar research 2. Crimean Astrophysical Observatory 3. Crimea.—Author's abstract.*

10.3-100

523.3

Urey, Harold C. (*Univ. of Chicago*), **The origin and significance of the moon's surface.** (In: Beer, Arthur (ed.), *Vistas in astronomy*. pub. London, 1955-1956. Vol. 2:1667-1680. fig., 52 refs.) **DLC, DWB** (520.82 B415v)—Some sixty years ago G. K. GILBERT wrote a remarkable paper on the structure and origin of the moon's surface, and subsequent students of the subject with various scientific backgrounds have come to similar conclusions, often without knowing of the previous work. GILBERT's ideas and those of other investigators are reviewed and some new points are added. It is contended that the moon was formed at predominantly low temperatures, that the face of the moon was fashioned mostly at the terminal stage of its formation and during a period of 10^6 years or less, that it was always at a distance substantially greater than the Roche limit, and that the craters, mountains, and maria are mostly the result of collisions of satellites of the earth-moon system with its surface. *Subject Heading: 1. Moon s surface.—Author's abstract.*

10.3-101

523.75

Macris, J., **Recherches sur les spicules en projection sur le disque solaire.** [Research on spicules in projection on the solar disk.] *Annales d'Astrophysique*, Paris, 20(5):179-184, Sept./Oct. 1957. 3 figs., 11 refs. French, English and Russian summaries. **DWB, DLC**—In a recent note, the author gave the results of research made from a series of plates, obtained in $H\alpha$ at the Arcetri solar tower, and relative to the dark features of the solar chromosphere features to be identified with spicules as seen in projection on the solar disk. This paper adds to the preliminary results of the author. *Subject Headings: 1. Spicules 2. Chromosphere.—Author's abstract.*

10.3-102

523.746/7

Xanthakis, Jean, **Les aires des taches solaires et des faculae en fonction du temps d'ascension.** [Areas of sunspots and areas of faculae in the function of the time of rise.] *Geofisica Pura e Applicata*, Milan, 39:1-12, Jan./April 1958. 6 figs. 7 tables, 2 refs., 15 eqs. French and English summaries p. 1. **DLC**—The author studies the areas of the sunspots (umbra + penumbra), the areas of umbrae and faculae. He shows: 1) That the maxima area of the sunspots (umbra + penumbra) and of the umbrae can be expressed analytically as a function of the time of rise and of one periodic term of a period of 8 solar cycles. And 2) The mean area and the total area in each cycle are also expressed as a function of the time rise and of periodic terms whose periods are 2 and 4 solar cycles for the areas of the sunspots and umbrae and 3 cycles for the total area of the faculae. *Subject Headings: 1. Sunspots 2. Solar faculae.—Author's abstract.*

10.3-103

523.74

Laborde, G., **Spectrophotométrie des taches solaires: détermination de la température d'excitation.** [Sunspots spectro-photometry. Determination of the excitation temperature.] *Académie des Sciences, Paris, Comptes Rendus*, 245(23):2009-2010, Dec. 4, 1957. 5 refs.

DLC—Determination of the excitation temperature in the sunspot and in the photosphere by means of the MgH and C₂ bands. Measurement of the equivalent widths was made through assimilating the rays profile to a Gauss' profile. The concordance existing between the results provided by the two molecules C₂ and MgH corroborates the identification of the MgH spectrum, previously made in the photosphere. *Subject Headings: 1. Sunspot spectrophotometry 2. Excitation temperature.—A. V.*

10.3-104

523.74

Servajean, Roger, *Sur la répartition en profondeur de l'effet Evershed dans les taches solaires*. [The depth distribution of the Evershed effect in sunspots.] *Académie des Sciences, Paris, Comptes Rendus*, 246(8):1158-1160, Feb. 24, 1958. fig., 3 refs. **DLC**—By means of measurements done on spectrograms taken at Meudon, and of the theory of the rays of formation level, the author tries to establish the depth repartition of Evershed speeds in sunspots. *Subject Headings: 1. Sunspots 2. Evershed effect 3. Meudon, France.—A. V.*

10.3-105

523.746

Warwick, James W. (*High Altitude Obs. Colo. Univ.*), *Formation of absorption lines in a sunspot*. *Annales d'Astrophysique*, Paris, 20(4):165-174, July/Aug. 1957. table, 30 eqs., 8 refs. French, English and Russian summaries. **DWB, DLC**—After pointing out the importance of a satisfactory theory of line formation in sunspots, we derive two alternative sets of transfer equations, the one in terms of a new set of intensity parameters which lead to a symmetric formulation, and the other in terms of Stokes' parameters. For a simple, but important, choice of the source function, we derive formal solutions to the symmetric transfer equations. *Subject Headings: 1. Line formation in sunspots 2. Absorption lines in a sunspot.—Author's abstract.*

10.3-106

523.746:550.385

Newton, H. W. (*Royal Greenwich Obs., Herstmonceaux Castle, Sussex*), *The lineage of the great sunspots*. (In: Beer, Arthur (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:666-674. 2 figs., 3 tables, 19 refs.) **DLC** (QB3.B35)—Early historical records bear witness to the occurrence of great sunspots in past centuries, and telescopic records have contributed more precisely to the story which is taken up by the Greenwich observations started in 1874. Since then, fifty-four great spots, with a mean area for the solar disk-passage of ≥ 1500 millionths of the sun's hemisphere have been observed. These spots, of which the first appeared in 1882, are listed in an Appendix. Their characteristics are briefly considered, including a marked tendency for them to be associated with geomagnetic storms. The progress of the observational side of solar physics during the past seventy years is then reviewed against the background of these great sunspots which, by virtue of their size and range of associated phenomena, have presented themselves as unique objects for observational research. *Subject Headings: 1. Sunspot data 2. Sunspots and magnetic storms.—Author's abstract.*

10.3-107

523.746

†Sweet, P. A. (*Univ. of London Obs.*), *The structure of sunspots*. (In: Beer, Arthur (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:675-685. 4 figs., 2 tables, 36 refs., 2 eqs.) **DLC** (QB3.B35)—A survey is made of the observations of sunspots. This is used to construct a model of the surface layers. A theoretical interpretation of this leads to a theory of the origin of the Evershed effect. The deeper layers are discussed and an appreciation is given of current theories of the origin of the darkening. The origin of the magnetic field and the relation of sunspots to the solar cycle have not been considered. *Subject Heading: 1. Sunspot structure.—Author's abstract.*

10.3-108

523.746

Tuominen, Jaakko (*Univ. of Helsinki, Finland*), *On mean latitudinal movements of sunspots*. (In: Beer, Arthur (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:691-695. fig., 14 refs., 4 eqs.) **DLC** (QB3.B35)—An analysis of the motions of sunspots in latitude indicates that (1) between about -16° and $+16^\circ$ heliographic lat. the spots

are drifting towards the equator, while beyond these parallels they are moving towards the poles, and that (2) this larger system of meridional "vortices" seems to be superimposed by another system which divides the sun into zones about 10° wide from south to north. *Subject Heading: 1. Sunspot movements.—Author's abstract.*

10.3-109

523.75

Blackwell, D. E. (*The Observatories, Cambridge*), **The excitation temperature of the solar chromosphere determined from molecular spectra.** (In: Beer, Arthur (*ed.*), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:726-732. 3 figs., 3 tables, 14 refs. **DLC** (QB3.B35)—The excitation temperature of the solar chromosphere is derived from a study of the rotational structure of the $4216 \text{ \AA}$ system of CN and the *P*- and *R*-branches of the (0,0) band of the $^2\Delta$ - $^2\Pi$ system of CH. The temperatures are 5400° , 7400° , and 5100° . *Subject Headings: 1. Chromosphere temperature 2. Solar spectrum.—Author's abstract.*

10.3-110

523.75

Redman, R. O. (*The Observatories, Cambridge*), **The widths of narrow lines in the spectrum of the low chromosphere, measured at the total eclipse of Feb. 25, 1952.** (In: Beer, Arthur (*ed.*), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:713-725. 5 figs., 4 tables, 9 refs.) **DLC** (QB3.B35)—The spectrum of the chromosphere was photographed at the total solar eclipse of Feb. 25, 1952, with a slit spectrograph, using the second order of a 6-in Rowland concave grating. Line widths were measured in both ultraviolet and yellow. Both regions show ξ_0 near 2.5 km per sec. for heavy elements in the lowest chromosphere (average line of sight velocity about 1.8 km per sec.), in close agreement with measures made at the 1940 eclipse. There is some evidence for a small increase of velocity with height. *Subject Headings: 1. Chromospheric spectra 2. Solar eclipse, Feb. 1952.—Author's abstract.*

10.3-111

523.75

Dollfus, A., **Classification des raies d'émission de la couronne solaire.** [Classification of the emission rays of the solar corona.] *Académie des Sciences, Paris, Comptes Rendus*, 245(23):2011-2012, Dec. 4, 1957. 6 refs. **DLC**—Coronal ray classification based on a comparative examination between the spectra of the total sun's eclipse on Feb. 25, 1952, and the spectra obtained with the coronagraph are presented. Radiations are sorted out in four distinct types. The ionization potentials, theoretically determined by B. EDLÉN for a large number of these rays seem, on the whole, to adhere strictly to this classification. *Subject Heading: 1. Coronal emission rays.—A.V.*

10.3-112

523.75

Vitkevich, V. V., **Sverkhkorona solntsa.** [The sun's outer corona.] *Priroda*, Moscow, 46(12):15-20, Dec. 1957. 9 figs., ref. **DLC**—The methods and results of the sun's corona observations by the translucence method of receiving radio emanations of the Crab nebula at the time of its presence in the vicinity of the sun, carried out in June 1951 at the Crimean Scientific Station, Physical Institute of the U.S.S.R. Academy of Sciences, are described and commented on. The results of observations of recent years have established the fact that the sun is surrounded by an outer corona extending from several to 20 solar radii. Thus the sun is surrounded by huge clouds of ionized gas extending to 10 million kilometers, and more. *Subject Heading: 1. Sun's corona.—A.M.P.*

10.3-113

523.741

Pecker, J. C., **L'écart à l'équilibre thermodynamique local dans la photosphère solaire.** [Divergence from local thermodynamic equilibrium in the solar photosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 245(5):449-502, July 29, 1957. fig., 3 refs. **DLC**—The study of the intensity of titanium rays reveals that the local thermodynamic equilibrium is far from being a reality within the photospheric layers. For the studied rays, the divergence from local thermodynamic equilibrium is considerable in photospheric layers with a continuous optical depth less than one unit. This divergence decreases as penetration in the photosphere increases; it also decreases from rays with a low excitation potential at their lower level to those

having a lower level with high excitation potential. *Subject Headings: 1. Astrophysics 2. Solar photosphere.—A.V.*

10.3-114

523.741

Plaskett, H. H. (*Univ. Obs., Oxford*), **Physical conditions in the solar photosphere.** (In: Beer, Arthur, ed., *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:637-647. 3 figs., table, 15 refs., 9 eqs.) **DLC** (QB3.B35)—From the source-function, recently derived by SYKES, the temperature is found as a function of optical depth in the solar photosphere. The temperature distribution leads in turn to the gas pressure. To find these and other physical parameters it is necessary to assume that the photosphere is in local thermodynamic equilibrium. The uncertainty produced in these quantities by this and other assumptions, as well as by observational error, is briefly discussed. The deep layers of the photosphere, where $(d \ln T / d \ln p) > 0.4$, are unstable; the steep temperature gradient may arise from boundary cooling. It is shown that solar granulation probably originates in the zone of observed instability rather than in the deeper-lying hydrogen-convection zone. *Subject Heading: 1. Solar photosphere.—Author's abstract.*

10.3-115

523.788

†Hagihara, Yusuke (*Tokyo Astronomical Obs.*), **Recent eclipse work in Japan.** (In: Beer, Arthur, (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:708-713. fig., 29 refs.) **DLC** (QB3.B35)—Eclipse work is summarized for the total eclipses on June 19, 1936; Sept. 21, 1941; Feb. 4-5, 1943; and for the annular eclipse on May 9, 1948—in which photographic and three-color photoelectric photometry, spectrophotometry, and polarization of the solar corona were studied. The solar limb-darkening was also investigated. In the geodetic program during the annular eclipse for determining the figure and the dimension of the earth, the large plumbline deviation of the Japanese Islands was confirmed. *Subject Headings: 1. Eclipse observations 2. Japan.—Author's abstract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: Light scattering function tables (Boll et al.), 10.3-26; *Meteorological tower, Sonnblick* (Sauberer), 10.3-40; *Chinese met. networks* (Tu), 10.3-56; *Rostov Hydromet. station, U.S.S.R.* (Nichkevich, Blagoveshchenskiĭ), 10.3-57; *Agromet. stations, Stavropol District, U.S.S.R.* (Svisiuk), 10.3-59; *Mountain observatories, White Face Mt., N. Y.* (Schaefer), 10.3-60; *High altitude res. stations, Climax, Colo.* (Roberts), 10.3-61; *Radar precip. measurement bibliog.*, 10.3-68; *Wind computations at sea* (Drogaitsev), 10.3-73; *Air-borne weather radar* (Balzer), 10.3-150; *Soil moisture obs.* (Kusakabe), 10.3-307.

10.3-116

551.501.4:551.579.4

Alekseev, G. A., **O metodakh rascheta maksimal'nykh raskhodov i gidrografov navodkov pri otsutstvii nabliudenii.** [Methods of calculating maximum runoff and flood hydrographs in the absence of observations.] *Meteorologiya i Gidrologiya*, Leningrad, No. 6:40-45, June 1957. fig., 6 refs., 17 eqs. **DWB.** Fuller version in French, *Méthodes principales de calcul de l'écoulement maximum en l'absence d'observations.* [Principal methods of maximum runoff calculation in the absence of observations.] *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957, [Transactions]*, Vol. 3: pub. 1958. p. 308-321. fig., 30 eqs. English summary p. 308-309. **DWB** (M 06) 1611g)—In the absence of hydrometric observations the maximum flood discharges are computed by either empirical or semiempirical formulas. These formulas are examined with particular reference to the review of such formulas by D. L. SOKOLOVSKIĖ (*Met. i Gid.*, No. 5, 1956). The author discusses the characteristics and adequacies of the various formulas. The empirical formulas for calculating the maximum runoff modal are generally of the form $q_m = A q$

$= \frac{A}{(F+1)^n}$; the semiempirical formulas are either based upon geometrical schematization of the

form of the flood hydrograph in the form of a triangle where

$$q_m = \frac{0.0116h}{t_n} f \quad \text{or} \quad q_m = \frac{0.0116h}{T} k_1.$$

Different methods of simplifying the general genetic formula of flood discharge are represented by the types:

$$q_m = \frac{q'_0}{\frac{1+q'_0}{h} \tau} \text{ mm/24 hrs} \quad \text{or} \quad q_m = \frac{0.0116 q'_0}{\frac{1+q'_0}{h} \tau} \text{ m}^3/\text{sec km}^2.$$

The use of these formulas, the calculation of the coefficients and the reliability of the computed maximum discharge are discussed. *Subject Headings: 1. Maximum flood discharge calculations 2. Flood hydrographs.—I.L.D.*

10.3-117

551.501:551.578.11

†Pearson, John E. and Martin, Gordon E., **An evaluation of raindrop sizing and counting techniques.** Illinois. State Water Survey (and Illinois Univ.), Contract AF 19(604)-1900, Scientific Report, No. 1, Nov. 1957. 116 p. figs.—Close to 200 papers dealing with raindrop measurement are reviewed in 18 chapters, each dealing with a particular type of technique (sizing by images on a surface, mechanical, inertia, velocity, energy, radioactive sorting, electrical, optical, microwave, photographic, television, and related techniques and devices such as artificial drop production, drop illumination, liquid water content measurement, etc.). Every chapter includes an introductory section in which the technique is described and evaluated; this is followed by abstracts (in some cases amounting to sizable reviews) of pertinent papers. Several illustrations of instruments are included. *Subject Heading: 1. Raindrop size measurement techniques.—G.T.*

10.3-118

551.501.4:551.573 (57/8)

Afanas'ev, A. N., **K voprosu rascheta velichiny ispareniiia s vodnoi poverkhnosti vodoemov, nakhodiashchikhsia v fizikogeograficheskikh usloviakh Sredne-Sibirskoi vozvyshechnosti.** [The problem of calculating the magnitude of evaporation from the water surface of reservoirs under the physiographic conditions of the Central Siberian plateau.] *Meteorologiya i Gidrologiya*, No. 10:39-41, Oct. 1956. fig., 2 tables, 2 refs. **DWB, DLC**—The various formulas of B. D. ZAIKOV, and A. P. BRASILAVSKIĭ and Z. A. VIKUBINA for computing evaporation from water surfaces of reservoirs are tested on the basis of actual data obtained on an evaporation area near the Angara River. Observations show that calculations by Zaikov's formula vary by only 2% from actual measurements. The influence of water basins upon evaporation from an experimental area is discussed. *Subject Headings: 1. Evaporation calculations 2. Evaporation from reservoirs 3. Central Siberian plateau.—I.L.D.*

10.3-119

551.501.45:551.55

Lowry, William P. (Oregon Forest Experiment Station), **A rapid, objective summary technique for use with pairs of vectors.** *American Meteorological Society, Bulletin*, 39(5):266-272, May 1958. 11 figs., 3 tables, 4 refs. **DWB, DLC**—A scheme was required for interpretation of wind data collected manually in rough terrain. In response to this need, an analysis technique was developed in which "synoptic" pairs of observations from two stations were combined and summarized in an index number. This technique is described and its application to the original problem presented. Application to three other types of analyses is described and discussed. *Subject Headings: 1. Wind vector calculations 2. Wind analysis.—Author's abstract.*

10.3-120

551.501.7

Reynolds, Jay F., Jr. (U. S. W. B.), **A template for rapid recomputation of upper air soundings.** *Monthly Weather Review*, Wash., D. C., 85(11):362-364, Nov. 1957. fig. **DWB**

—A two-part template designed for use with WB Form 770-10 and adopted by the NAWAC (U. S. National Weather Analysis Center) is presented and its construction and use described and illustrated. The templates are for rapid recomputation of soundings plotted on pseudo-adiabatic charts, when these soundings come from all over the N. Hemisphere and must be checked rapidly before the data can be used on upper air charts or for prognoses. Range is from 1050 to 400 mb and 500 to 175 mb thickness. Values may be read off directly and accumulated in the usual manner. *Subject Heading: 1. Templates.—M.R.*

10.3-121

551.501.7:551.508.822

†Woelfle, Friedrich, *Aerologische Messgeräte*. [Aerological measuring instruments. (In: Linke, Franz, *Linkes Meteorologisches Taschenbuch*. New ed. Leipzig, 1957. 3:348-425. 13 figs., 137 refs.)] **DLC** (QC864.L53)—All aspects of radiosonde and upper air wind sounding techniques and equipment are treated systematically and in great detail, including basic principles, transmission, recording, calibration, accuracy, etc. Pressure elements (aneroid capsules, hypsometers, alphantrons); temperature elements (expansion thermometers, resistance thermometers, thermoelements, acoustical thermometers); humidity elements (organic, electrolytic, ceramic, etc.); radio telemetering and receiving; airplane meteorographs, balloons (pilot and radiosonde); various types of radiosondes (German H-50, Swiss, French, U. S. W. B., English Kew type, Finnish Väisälä, Mullard-Radar-Sonde, potential gradient and dew point radiosondes), calibration and improvement of accuracy or sensitivity; optical and radio location methods for wind aloft measurement, radar and radio theodolite methods are described. An extensive list of references is added. *Subject Headings: 1. Radiosonde operation 2. Radiosondes 3. Upper air instruments.—M.R.*

10.3-122

551.501.721:551.521.11

Averkiev, M. S., *Prostoi sposob priblizhennogo rascheta sutochnykh summ insoliatsii gorizonta'noi poverkhnosti pri bezoblachnom nebe*. [A simple means for the approximate calculation of daily sums of insolation on a horizontal surface with a cloudless sky.] *Meteorologiya i Gidrologiya*, Leningrad, No. 9:25-26, 1957. 4 tables, 6 refs., 9 eqs. **DWB, DLC**—LAUSCHER's formula for determining the total daily insolation on a horizontal surface is devised, namely $Q' = 0.55 I_0 T$. Since the character of daily insolation varies with latitude, season and transparency 0.55 is variable and is replaced by k . By means of BERLAGE's formula, $q = B(Q_0 - Q')$, the total diffuse radiation (q) can be computed where Q' —daily total direct radiation upon a horizontal surface, Q_0 —daily total diffuse radiation at the boundary of the atmosphere, and B —a coefficient varying with transparency. The calculation of daily insolation total for a given day is illustrated with the aid of these formulas and of the values for the coefficient B and total insolation (cal/cm^2) at the boundary of the atmosphere for a mean distance between sun and earth ($I_0 = 1.88$) given in tables. *Subject Headings: 1. Insolation calculations 2. Diffuse radiation.—I.L.D.*

10.3-123

551.501.75:551.555

de Jong, H. M. (*Royal Netherlands Met. Inst., De Bilt*), *Errors in upper-level wind computations*. *Journal of Meteorology*, Boston, 15(2):131-137, April 1958. 8 figs., 3 tables, 2 refs., 27 eqs. **DWB, DLC**—The evaluation of upper level wind data by means of balloon tracking methods involves a number of determinative and random errors. These errors depend on the precision in locating the points of the balloon track, which in their turn are related to the accuracy of measuring quantities such as azimuth, elevation angle, slant range, balloon height, and time. Since the number of quantities needed for plotting the horizontal projection of the balloon's track by radar systems is supernumerary, the observations may be arranged in three classes. The purpose of this paper is to determine which of these classes yields the best precision of measure in wind speed and direction. Moreover the errors are considered as a function of balloon height, wind speed, rate of ascent and time interval between two successive measured points. For special cases the extreme values of the random errors, dependent on the location of the balloon's trajectory with regard to the direction of observation, are presented in the form of tables. *Subject Headings: 1. Upper air wind calculations 2. Upper air wind measurement errors 3. Balloon trajectories.—Author's abstract.*

10.3-124

551.501.8:551.557

Malet, L. M. (*Royal Met. Inst., Brussels*), *Effet de la réfraction atmosphérique des ondes électromagnétiques et de la courbure terrestre sur les mesures du vent en altitude*. [Effect of atmospheric refraction of electromagnetic waves and of the earth's curvature on the measurement of upper air winds.] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 30(4):268-288, 1958. 3 figs., table, 6 refs., 54 eqs. German, English and French summaries p. 268-269. **DLC**—This work deals with the computation of the corrections to be applied to the components of upper winds to allow for the earth's curvature and the atmospheric refraction. These corrections are given as functions of data directly observed (azimuth, elevation, slant range) or computed (altitude, horizontal range). 1) It is shown that the corrections are negligible when upper winds are determined from observations of azimuth, elevation and slant range (radar or transponder) or from observations of azimuth, slant range and altitude (simplified radar or transponder associated to a P.T.U. sounding). 2) A relation is established giving the corrections to be applied to the heights of a balloon obtained from a radar or a transponder. 3) Another relation gives the corrections to be applied to horizontal distances obtained from a radiotheodolite associated to a P.T.U. sounding. 4) Examples show that the corrections are important only when the speed of upper winds reaches high values. *Subject Headings*: 1. Radar wind measurement techniques 2. Electromagnetic wave refraction 3. Curvature corrections 4. Upper air winds.—*Author's abstract*.

OBSERVATIONAL DATA

See also: Mean monthly absolute topography over Northern Hemisphere (Jacobs), 10.3-14; IGY data center and IGY met. program, 10.3-37; *also* 10.3-37 to 10.3-43 (IGY); Upper air observations, Central Soviet Arctic (Gaigerov), 10.3-49; Climatic data for Mould Bay, N.W.T., Canada, 10.3-50; Flying weather charts, Gander, Newfoundland (Page), 10.3-83; Maize phenology (Shigolev), 10.3-86.

10.3-125

551.506.1(058)(436)

*Austria. Zentralanstalt für Meteorologie und Geodynamik, *Jahrbuch* [Yearbook], New Ser. Vol. 93 (Old Ser., Vol. 101), 1956. issued Vienna, 1957. 18 p.+appendices. numerous tables. Appendix D, No. 1, Roller, M.: *Phänologische Übersicht über das Jahr 1956*. [Phenological summary for 1956.] No. 2, Hader, F.: *Gewitter, Unwetter und Wetterlagenkalender 1956*. [Thunder, bad weather and weather type calendar for 1956.] No. 3, Roller, M.: *Lokale Sonnenauf- und Untergangszeiten und örtliche mögliche Sonnenscheindauer ostalpiner Orte*. [Local time of sunrise, sunset and number of hours of possible sunshine at East Alpine places.] *Also*: Its *Jahrbuch*, Vol. 94, 1957. issued Vienna 1958. 26 p.+Append. A-E. numerous tables. **DWB, DLC**—Standard yearbook giving (A) daily observations for Vienna (Hohe Warte) and Sonnblick, and (B) monthly and annual summaries for stations with and without barometers, respectively. Section C gives 5 day means of air and soil temperature, daily total illumination, global radiation and sky radiation for Vienna, temperature and precipitation frequency for 180 stations, snow and rainfall (totalizer) records. Section D contains 3 articles listed above, and section E the seismic data for Vienna. *Subject Headings*: 1. Annual meteorological data summaries 2. Yearbooks 3. Vienna, Austria 4. Sonnblick, Austria 5. Austria.—*M.R.*

10.3-126

551.506.1(058)(83)

*Chile. Oficina Meteorológica de Chile. Seccion Climatológica, *Anuario Meteorológico*, [Meteorological Annual], 1943. Pub. Dec. 1957. 115 p. Mimeo. At head of title: Ministerio de Defensa Nacional. Fuerze Aerea de Chile. **DWB**—Complete tabulations are given for 50 stations in Chile and limited tables of rainfall data for 225 stations. Thrice daily observations (12, 18 and 23 Z) of the synoptic elements appear in the tabulations along with wind direction frequencies and mean monthly wind speed. Three stations (Arica, Canchones and Antofagasta) had absolutely no precip. during the year 1943, and one station (Iquique) had only 1 day with 2 mm of rain. On the other hand, 2 stations had >4000 mm (160")—San Pedro (47°43'S) with 4231 mm on 278 days and Puerto Marin (40°S) with 4572 mm (180"). *Subject Headings*: 1. Annual meteorological data summaries 2. Chile.—*M.R.*

10.3-127

551.506.1(058)(994)

*Falkland Islands. Meteorological Service, **Annual Meteorological Tables, 1954, prepared in conjunction with the Meteorological Office, London.** Pub. Falkland Islands, 1956. 136 p. Also: **Tables, 1955.** Pub. 1957. 151 p. Also: **Tables, 1956.** Pub. 1958. 175 p. Almost entirely tables. DWB—The size of this thorough annual data report has quadrupled since the 1951 issue, and includes data for 8 stations (Stanley, Grytviken, Signy I, Hope Bay, Admiralty Bay, Deception Islands, Argentine Islands, and Horseshoe Islands) in Falkland Islands (51°42'S, 57°5'W) South Georgia, South Orkneys, and the S. Shetlands and Grahamland (67°48'S, 67°14'W)). Tables of means, extremes and frequencies of 3-hourly surface data, and 1100 a.m. upper air data are included. The 1955 issue contains complete upper air data for Argentine Islands for the first time. (For abstract on 1953 issue, see 7.3-96, March 1956; for 1951 and 1952 issues see 5.1-46, Jan. 1954, MAB.) *Subject Headings:* 1. Annual meteorological data summaries 2. Upper air data 3. Falkland Islands.—M.R.

10.3-128

551.506.1(058)(665.7,673,679,512.318)

*Portugal. Serviço Meteorológico Nacional, **Anuário Climatológico do Portugal, Pt. 2, Territórios Ultramarinos (Observações de Superfície)** [Climatological Yearbook of Portugal, Pt. 2, Overseas Territories, surface observations], Vol. 9, 1955 and Vol. 10, 1956. pub. 1956 and 1957. 118 p. and 130 p. Almost entirely tables. DWB, DLC—Extensive tables of data for Bolama, Portuguese Guinea, Sao Tomé, Angola, Mozambique, Goa, India, Macao and Timor. Data include 3 times daily pressure, temp., humidity, wind direction and speed, cloudiness and hydrometers, as well as sunshine, visibility, state of soil, precip. and evaporation. Monthly and annual summaries are also included for 8 stations in Guinea, 2 in S. Tomé and Príncipe (Airports), 12 in Angola, 12 in Mozambique, 10 in Goa, 1 in Macao and 18 in Timor. Also annual monthly summaries from a larger number of rainfall stations are included. *Subject Headings:* 1. Annual meteorological data summaries 2. Portuguese Colonies.—M.R.

10.3-129

551.506.1(493)

Sneyers, R., **Le temps en mars et avril 1958.** [The weather in March and April 1958. *Ciel et Terre*, Brussels, 74(5/6):284-288, May/June 1958. DLC—Climatological summary describing the weather that prevailed in Belgium during the months of March and April 1958. During March, the weather in Belgium was determined through the predominant influence of polar currents—not very windy, fairly sunny, but abnormally cold; generalized pluviometric deficit. During April, predominance of polar currents, normal sunshine, but abnormally cool and normal precipitation. *Subject Headings:* 1. Monthly climatological summaries 2. Belgium.—A.V.

INSTRUMENT CARRIERS

See also: **Operation Vanguard** (Buedeler), 10.3-34; **Soviet IGY rocket program** (Poloskov, Mirtov), 10.3-39; **Artificial satellites** (Baumeister), 10.3-43; **Rocket spectrometer measurement of upper atmosphere, New Mexico** (Meadows, Townsend), 10.3-182; **Rocket ionosphere experiments** (Pfister, Ulwick), 10.3-205.

10.3-130

551.507.321.2:551.508.822

*Dirks, W., **Über die Technologie aerologischer Ballone.** [Technology of aerological balloons.] *Zeitschrift für Meteorologie*, Berlin, 11(8):233-240, Aug. 1957. 2 figs., 6 tables, 8 refs., 6 eqs. DWB, DLC—The results of an investigation on the physical characteristics of plastic aerological balloons and their technological requirements carried out in connection with the sudden failure of the radiosonde balloons of the German Democratic Republic in 1957 to attain altitudes reached in 1956. These balloons, which consist of segments or gores of natural rubbers, were compared with balloons of other countries. Tabular and graphic data are presented on the volume, diameter, surface, sheet thickness and expansion of balloons of 750 gm at various altitudes and pressures (up to 30 km and 15 mb), the strength conditions of a 750 gm balloon (sheet thickness=0.4 mm, load=0.6 kg) and of a 1500 gm balloon (sheet thickness 0.4 mm and loads of 0.6 and 1.2 kg) including the tensile strength at various intervals, pressures for different elevations, the expansion of the various balloons at different tem-

peratures, maximum bursting strength of the various balloons and the ascent heights of the balloons of the various countries. The defects of the balloons of the German Democratic Republic lay in the structural defects in the rubber sheets out of which the balloons were made, and their lower resistance to cold, in their construction out of separate segments, etc. A discussion of the technical aspects of manufacturing the rubber for use in balloons is presented. *Subject Headings:* 1. Radiosonde balloons 2. Balloon elasticity 3. Balloon bursting height 4. German Democratic Republic.—*I.L.D.*

10.3-131

551.507.352:551.576.1:551.524.7

Cunningham, R. M., *Flight observations on the fine structure of cumulus clouds.* *Schweizer Aero-Revue*, Berne, 33(2):100-103, 1958. 4 figs., 4 refs. **DLC**—Study based on detailed measurements taken during several years in execution of a program established by the Geophysics Directorate of the U. S. Air Force. Flights made with an airplane, equipped with improved instruments, permitted the determination of temperatures and humidities of clouds. These measurements made possible the study of the structure of clouds and of the meteorological conditions of inversions in the clouds, and also of the atmospheric conditions in the vicinity of clouds. *Subject Headings:* 1. Cumulus cloud structure 2. Airplane observation of clouds 3. Inversions 4. Thermodynamics.—*A.V.*

10.3-132

551.507.362.2:551.510.5

Fedorov, E. K., *Issledovaniia verkhnikh sloev atmosfery pri pomoshchi raket i iskusstvennykh sputnikov zemli.* [Investigation of the upper atmospheric layers by means of rockets and artificial earth satellites.] *Priroda*, Moscow, 46(9):3-12, Sept. 1957. 6 figs., ref. **DLC**—The greater possibilities of investigating the upper atmospheric layers by means of instruments installed in artificial earth satellites—expected to be set in motion by the U.S.S.R. and U. S. shortly (during the current IGY)—and the superiority of data thus obtained over that of rockets, are discussed and reviewed. *Subject Headings:* 1. Satellite observations 2. Rocket observations 3. Upper atmosphere research.—*A.M.P.*

10.3-133

551.507.362.2:551.510.536

Nonweiler, T. R. F. (*Queen's Univ., Belfast, N. Ireland*), *Perturbation of elliptic orbits by atmospheric contact.* *British Interplanetary Society, Journal*, 16(6):368-379, April 1958. 2 figs., 2 tables, 5 refs., 26 eqs. **DLC**—This is a mathematical treatment of the case in which a vehicle would be describing an elliptic orbit with focus at the center of a spherical earth, were it not that, at its perigee, it makes contact with the tenuous outer limits of the atmosphere (assumed at rest relative to the earth's center). It is assumed that the disturbance to the motion due to air resistance is sufficiently small that it may be treated as a perturbation, and the approximate change on the features of the instantaneous orbit is calculated. The approximation lies in the neglect of the effect of the perturbations during any one orbital circuit on the magnitude of the air resistance itself, and certain assumptions about air density variation with height. *Subject Headings:* 1. Satellite orbits 2. Outer atmosphere.—*Author's abstract.*

INSTRUMENTS

See also: Aerological instruments (Molchanov), 10.3-25; Tower for radiation measurement, Sonnblick (Sauberer), 10.3-40; Upper air instruments (Woelfle), 10.3-121; Radiosonde balloons (Dirks), 10.3-130; Northwesterers in West Bengal and radar thunderstorm detection, Dum Dum Airport, Calcutta (Das, Gangopadhyaya), 10.3-212; Extreme winds, Lord Howe Island (Hounam), 10.3-266; Nuclei effectiveness (Georgii), 10.3-283; Cloud height measurement (Vorob'ev), 10.3-294; bibliog. on Soil Moisture, p. 423.

10.3-134

551.508.21

Suomi, V. E., *An economical net radiometer.* *Tellus*, Stockholm, 10(1):160-163, Feb. 1958. 5 figs., 5 refs., 3 eqs. **DWB, DLC**—A net radiometer of moderate accuracy but of simple construction and very low cost is described. The value of net radiation is obtained from the difference of fourth power temperatures of the upper and lower radiating surfaces.

Conduction losses are held to a low value by employing a good insulating material and ventilation losses above and below are kept to a low value by two layers of this polyethylene film. Field tests, calibration data, and applications are described. *Subject Heading: 1. Radiometers*.—*Author's abstract.*

10.3-135

551.508.29:551.584

Czelnai, Rudolf, *Hőmérőtermisztorok alkalmazása a mikrometeorológiai kutatásban* [Use of thermistors in micrometeorological research.] *Időjárás*, Budapest, 61(5):357-363, Sept/Oct. 1957. 8 figs., eqs. Russian summary p. 357. **DLC**—Possibilities and practical problems of the use of thermistors for micrometeorological temperature measurement are discussed. Data are presented on the spontaneous heating and the temperature lag of Tungstam 2TH type thermistors, as well as on the requirements to be met by such instruments. It is shown that this type of thermistor is adequate for use in the type of occasional measurement most frequent in micrometeorological research. *Subject Headings: 1. Thermistors* 2. *Micrometeorological research.*—*Trans. of author's abstract.*

10.3-136

551.508.29:551.508.53

Subrahmanyam, V. P. (*Dept. of Geophy., Andhra Univ., Waltair*), **L-type thermistor as an anemometer.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(4):458-459, Oct. 1957. 3 figs., 2 refs. **DWB, DLC**—The Stantel L-1311/120 thermistor was studied to determine its resistance variations at room temperature for various power inputs in the external heater, to determine the wind calibration up to 2000 ft/min and to determine its performance in the field in comparison with a Hastings anemometer. Graphs show the regular behavior of the thermistor as an anemometer for short period fluctuations of wind speed both in tunnels and in the field (Feb. 13, 1957). If heating current is not heavy the thermistor proves sufficiently stable in calibration. It is also independent of wind direction. *Subject Headings: 1. Thermistor anemometers* 2. *Thermistor calibration.*—*M.R.*

10.3-137

551.508.41

Mani, Anna (*Met. Office, Poona*), **A chamber for the calibration of Kew pattern barometers** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(4):455-456, Oct. 1957. fig. **DWB, DLC**—Equipment and procedures for calibrating Kew barometers (two at a time) over the entire range of their scales are described and illustrated. The chamber is installed in the India Met. Dept. Instruments Section at Poona. It was obtained years ago from R. W. MUNRO, London, for calibrating Fortin barometers. Temp. can be read to 0.1°C and pressure over range from 700 to 1000 mb. Corrections are determined to an accuracy of +0.1 mb. *Subject Headings: 1. Barometer calibration chambers* 2. *Kew type barometers.*—*M.R.*

10.3-138

551.508.53

Saissac, J., **Un anémomètre à prises de pression fixes.** [An anemometer with fixed pressure taps.] *Journal Scientifique de la Météorologie*, Paris, 9(33):19-21, Jan./March 1957. 3 figs. French, English and Spanish summaries p. 19.—The author describes non-directional taps for a depression anemometer, offering good practical qualities at different speeds, such as the facts that they will not become unhinged and are not excessively affected by deviations of incidence from the horizontal. *Subject Heading: 1. Anemometers.*—*Author's abstract.*

10.3-139

551.508.57

Todd, W. and Peterson, A., **New high-performance 1680 MC rawinsonde system.** *Weather Radar Conference, Sept. 1955, Proceedings of the Fifth . . . Conference*, pub. 1956. p. 207-212. **DWB**—The meteorological data computer in this high-performance 1680 MC rawinsonde system computes and records temperature, pressure information and relative humidity. In addition, it prints altitude data from them. Altitude and pressure data are encoded and recorded, but the latter is further fed to the unitary decimal digital recorder. Pressure, relative humidity, and temperature are printed to an accuracy of $\frac{1}{2}$ mb, 1% and 0.5°C, respectively, of the input data. *Subject Heading: 1. Rawinsondes.*—*N.N.*

10.3-140

551.501:551.508.72

*Uryvaev, P. A., *Vlianie na pokazaniia vodnykh isparitelei ikh razmerov i gruntov, v kotorykh oni ustanovleny*. [Influence of the size of evaporimeters, and the ground in which they are installed, on the readings.] *Leningrad. Gosudarstvennyi Gidrologicheskii Institut, Trudy*, 45(99):157-172, 1954. 5 figs., 12 tables, 5 refs. **DLC** (GB651.L38)—On the basis of investigations carried out in summer 1951 at the Valday Hydrologic Laboratory, the author concludes that it is possible to install evaporimeters in any type of turf covered ground. Further, he establishes that measured evaporation amounts decrease regularly with the increase of the area of evaporating surface. This decrease continues up to a determined size of evaporimeters which is different for different physico-geographical regions. The influence of the depth of evaporimeters is substantially noticeable only in the fall period. *Subject Heading: 1. Evaporimeters.—A.M.P.*

10.3-141

551.508.765

Hendrick, Roy W., Jr., *A forward scattering optical disdrometer*. Cornell Aeronautical Lab., Inc., Buffalo, N. Y., Contract AF 33(616)-3062, (Report) WADC TR 57-561, Aug. 31, 1957. 110 p. 59 figs. (incl. photos), eqs. **DWB** (M08.765 C814fo)—An air-borne instrument for measuring the spectrum of the concentration of droplets of various radii (a disdrometer) was developed. This disdrometer used the quantity of visible light scattered forward at about a 28° angle from its incident direction to measure the radius of individual droplets. Optical and electronic means are used to classify the amplitudes of signal pulses from individual droplets so as to produce a cumulative drop size distribution spectrum every two seconds. The present instrument scans the spectrum from 3.5 to 100-micron radius droplets. Means for extending this range down to 2-micron radius are suggested. This disdrometer was flight tested in a C-130 aircraft by the All Weather Flight Test Section of Wright Air Development Center. A high degree of inhomogeneity within some clouds was demonstrated, and a bimodal droplet spectrum with peaks at about 4-6 and 10-12 micron radii was obtained during one flight. The spray from an icing-simulation tanker plane was shown to consist almost entirely of droplets 8 to 9 microns in radius. *Subject Heading: 1. Disdrometers.—Author's abstract.*

10.3-142

551.508.77

Cristea, N., *Un model de pluviometru totalizator*. [A totalizing rain gage.] *Meteorologia si Hidrologia*, Bucharest, 1(2):49-50, Dec. 1956. **DWB**—A rain gage, which is being tested for use in the Romanian network, is described and its design shown. The gage has a collection surface of 200 cm²; it holds 25 l. of water. There are provisions against freezing, evaporation, etc. The gage is mounted on a tripod which facilitates precise horizontal installation 1½ in. from the ground. Details of operation are discussed. *Subject Heading: 1. Rain gages.—G.T.*

10.3-143

551.508.77:551.578.46

Koike, Ryôji (*Central Met. Observ., Tokyo*), *On the snow totalizer*. *Researches on Snow and Ice*, Tokyo, No. 2:157-163, Jan. 1955. 12 figs., 4 tables, 10 refs., 3 eqs. In Japanese. **DWB**—Six different kinds of totalizers used in American and European countries and one Japanese snow totalizer (inlet diameter, 20 cm; depth 70 cm; bottom diameter 60 cm; side slope 1/25; volume 3400 mm³; in CaCl₂ solution) are briefly discussed. The height of snow totalizer used in Japan ranges from 1-4 m. The Japanese snow totalizer, using 50 wt. % CaCl₂ (70% purity) solution, having 35% concentration (saturated) and 1.7 mm thick layer of turbine oil (sp.gr. 0.8) coating, gave good results. Water-proof type painting eliminates corrosion up to a negligible degree. The surface area of solution is far greater than that of inlet opening so prevent freezing of solution by quick thermal diffusion and minimum dilution. Three different methods of measuring snowfall (volumetric, concentration and weight difference) are discussed and results are tabulated for comparison, the volumetric method being better than others. The catching (collecting) snow (into totalizer) rate is also discussed. Note: "Catching rate" here is defined as the rate of snow accumulation with different totalizer conditions. *Subject Headings: 1. Snow totalizers 2. Snowfall measurement techniques.—J. Woo.*

10.3-144

551.508.765:551.578.11

†Lamp, R. (*American Aviation Weather Service, Rhein/Main*), *Das Tropfenspektrum in Niederschlägen und die Radar-Reflektivität nach fremden und eigenen Messungen*. [The

drop spectrum in precipitation and radar reflectivity according to measurements of the author and of others.] *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 30(4):223-245, 1958. 28 figs., 60 refs. German, English and French summaries p. 223-224. **DLC**—First the earlier methods for the determination of droplet diameter and number are discussed. Then the reasons are given which led to the development of a droplet recorder with large time resolution for the continuous registration of droplet sizes and number. Its construction is described. Next, observational results are discussed which can be obtained from the records. In three convectively caused and three advectively caused cases of precipitation, 235 records are available and 27,078 droplets were measured; for the individual rainfalls the variation of the intensity is described in detail, and the droplet number per m^3 , the water content per m^3 of rain air, and the distribution of the droplet size are represented graphically and described. The three-dimensional representation of the droplet distribution in particular permits one to arrange all quantities which are important for precipitation in figures which can readily be viewed. With the aid of these figures it is possible to confirm numerically the present concepts about the two main types of precipitation and to describe the differences between both types. The measurements described here contribute substantially to radar meteorology which increases more and more in importance. The following result is obtained: Heretofore it has been customary to characterize the radar reflectivity

$$\Sigma ND^3 = a \cdot R^b$$

tentatively by constant values of a and b . This is unsatisfactory, at least for the constant, a , since for purely convective rains approximately $a=415$, for advective rains approximately $a=150$. The parameter b varies with one exception only between 1.3 and 1.45. *Subject Headings*: 1. Drop size measurement techniques 2. Raindrop recorders 3. Radar rainfall measurement techniques.—*Author's abstract.*

10.3-145

551.508.77

Nothmann, Ernst (*Israel Met. Service*), A new recording rain gauge. *American Meteorological Society, Bulletin*, 39(5):273-275, May 1958. 3 figs. **DWB, DLC**—The precise measurement of rainfall is of great importance, particularly in subtropical and arid zones. The described instrument is the result of an effort to avoid principal or inherent errors found in other rain recorders by using two separate systems, one for recording to an accuracy of better than one per cent, the other for automatic emptying and resetting. A typical advantage is its self-cleaning feature. *Subject Headings*: 1. Rain gauge errors 2. Recording rain gauges.—*Author's abstract.*

10.3-146

551.508.77

Serra, Louis, Un nouveau type de pluviomètre pour l'enregistrement des précipitations en haute montagne. [New type of rain gage for recording rain in high mountains.] Reprint from *I.U.G.G. Association of Scientific Hydrology, Publication*, No. 36:277-286, 1956(?). 2 figs., graph, photos. **DWB**—An electrically registering precipitation recorder is described in detail, showing photos and diagrams of important parts. Propane bottles provide heat for six months during the winter. Satisfactory performance was achieved in the Haute Durance (French Alps). *Subject Headings*: 1. Rain gages 2. Haute Durance, France.—*A.A.*

10.3-147

551.508.822

Ishikawa, G., Temperature adjustment of a certain kind of radio-sonde. *Journal of Meteorological Research*, Tokyo, 9(9):652-655, Sept. 1957. 4 figs., 2 tables, 9 eqs. In Japanese; English summary p. 652. **DWB, DLC**—Certain kinds of radiosondes, like those for observing radioactive contamination or electric field in the upper atmosphere, should be kept preferably at room temperature throughout the flight. We have investigated the condition of keeping the temperature practically constant of the measuring part, which is shielded from the air flow in a large sphere of polyethylene membrane. The main factors of heating and cooling in this case are the heat production by mounted cells, heating by absorbing solar radiation and the cooling due to thermal conduction into the surrounding air. The necessary condition of temperature constant can be obtained either by changing the heat producing power of mounted cells or by choosing the suitable radiative absorptivity of the surface of measuring part. Three flights at Tatenos during 1956 were analyzed to get the exact values

of parameters which enter into the above treatment. *Subject Headings: 1. Radiosonde temperatures 2. Radiosonde calibration.—Author's abstract.*

10.3-148

551.508.822:551.524.7

Petit, M., *Emploi de thermomètres bilames blancs sans pare-soleil sur la radiosonde française*. [Use of white thermocouples without radiation shields on the French radiosondes.] *Journal Scientifique de la Météorologie*, Paris, 8(30):47-53, April/June 1956. 6 figs., 6 refs., table. French, English and Spanish summaries p. 47. **DLC**—The sun-guard chimney of the French radiosonde has been eliminated and the thermometer is coated with a special white paint. The difference between the temperature thus obtained and that of normal radiosondes is measured in soundings, which makes it possible to deduce a scale of magnitude of errors due to radiation. *Subject Headings: 1. Radiation error of radiosondes 2. French radiosondes.—Author's abstract.*

10.3-149

551.508.824(99)

Kamamoto, H. et al. (*all, Met. Instrument Plant, Japan Met. Agency, Fusa*), *Automatic climatological station for the Antarctica*. *Geophysical Magazine*, Tokyo, 27(4):565-578, Dec. 1956. 10 figs., 2 tables, 2 refs. **DWB, DLC**—The design and construction of an automatic climatological station for the Antarctic are described. It will record barometric pressure, wind direction, wind speed, sunshine duration, and air temperature throughout more than four hundred days, unattended and fed solely from its own battery cells. Time controls and programming are carried out in two ways, viz., by an electric self-winding clock and a spring-loaded one. Duplicated sensing elements and recorders are incorporated corresponding to these two clock-systems. Lubrication of the clocks and instruments is discussed together with other associated problems. *Subject Headings: 1. Automatic weather stations 2. Antarctic meteorology research stations.—Authors' abstract.*

10.3-150

551.508.85:551.501.7:551.551.1:629.13

Balzer, M. L. (*United Air Lines, Inc.*), *Eighteen months of storm avoidance with airborne radar*. *Weatherwise*, Boston, 10(6):189-192, 213, Dec. 1957. 3 figs., photo. **DWB**—A study, based on 3 yrs of data for April-Sept., aimed at determining the economics of airborne weather radar installed in United Air Lines passenger planes in 1956 and 1957 at a cost of \$4 million, is reported. Static discharge reports were reduced from 51 in 1955 (no radar) to 31 in 1956 (45% of planes had radar) and to 18 in 1957 (95% radar installation); unusual turbulence incidents were reduced from 39 to 16 to 8. Similar reductions are shown graphically for turbulence incidents per million miles, minutes of delay due to turbulence and turbulence duration or intensity per million miles and, lastly, favorable comments from 900 out of 1000 flight crew reports on use of airborne weather radar. The 3% unfavorable were mostly due to malfunction of equipment or unfamiliarity with its use. *Subject Headings: 1. Air-borne weather radar 2. Turbulence reduction in flight 3. United Air Lines.—M.R.*

10.3-151

551.508.85

Fujihara, H. and Shimojima, S. (*Japan Met. Agency, Tokyo*), *5.66 cm weather radars in Japan*. *Geophysical Magazine*, Tokyo, 27(4):551-564, Dec. 1956. 16 figs., 2 refs. **DWB, DLC**—The design, installation, and operation of two newly installed Japanese weather radars with 5.66 cm wave length are described together with observed echo images. Even after relatively short periods of actual operation and observation, they proved more than satisfactory for the proposed purposes, i.e., collection of information about typhoons and heavy rainfall. Also the ancillary radar echo integrator is described which may be considered to be still in its infancy. *Subject Headings: 1. Radar equipment 2. Radar echo integrators 3. Japan.—Authors' abstract.*

10.3-152

551.508.91:535.242

*Pollak, L. W. and Metnieks, A. L., *The fog in the photo-electric nucleus counter*. *Geofisica Pura e Applicata*, Rome, 38:181-208, 1957. 5 figs., 8 tables, 16 refs., 3 eqs. English and German summaries. **DLC**—A detailed analysis of the conditions for and of fog which forms in a photoelectric condensation nucleus counter. This fog affects measurements of extinction used as an index of nuclei concentration. In a fog tube 117.5 cm long it was found

that the optical density of the fog is proportional to a power of the length of the light path in the fog where its index varies with the extinction and its maximum is 1.37. The effect of turbulence in the fog tube and of processes in the cloud during the first 10–20 sec after expansion, of fogging of one or both sealing glass plates, of temperature of electrically heated glass sealing plates, and of the distance of the photocell from the bottom sealing glass, and of processes such as coagulation and evaporation of drops on measurements of extinction are considered. *Subject Heading: 1. Fogging of photoelectric nuclei counters.—M.R.*

10.3–153

551.506.7:551.508.952

Regener, Victor H., **Chemical telemetering sonde for balloon sounding of atmospheric ozone.** New Mexico. Univ. Dept. of Physics, Contract Cwb-8810, Research Report (un-numbered), Dec. 26, 1957. 29 p. 13 figs., table, 3 refs., eqs. DWB (M08.952 N532ch)—The principle of ozone measurement by the I. G. BOWEN, V. H. REGENER (1951) system, the details of the 8.8 lb instrument constructed under U. S. W. B. and U. S. A. F. contract (preparations of solution, air pump and calibration of the air flow, reaction chamber, metering and cycling device, amplifier, keying of the U. S. W. B. radiosonde, evaluation of radiosonde record in terms of ozone density), details of successful balloon flight to 27 km on Dec. 21, 1957 (using 4 balloons), preliminary operation instructions, general physical data of the ozonesonde and recommendations are included in this report. Appended are diagrams showing detailed construction, wiring, calibration, records and results obtained on the successful flight. *Subject Headings: 1. Ozonesondes 2. Ozonesonde data 3. Chemical telemetering ozonesondes 4. Albuquerque, N. Mex.—M.R.*

10.3–154

551.508.99

Agureev, S. P., **Perenosnyĭ uspokoitel'nyĭ urovnemer.** [Portable damping water level indicator]. *Meteorologiya i Gidrologiya*, No. 10:58, Oct. 1956. 2 figs. DWB, DLC. Trans. into English available for reference at U. S. Weather Bureau Library, 3 p. 2 figs. (M08.99 A2846p)—This water level measurer is based upon a method which involves damping the water level in a portable tube and measuring the level by means of a floating measuring rod. Measurements can be made with an accuracy of 0.5–1.0 cm. Its construction is described with the aid of diagrams. The water level is determined by means of the formula

$$P = (M + K) - (N + D)$$

where D —correlation for water density, $M + K$ —readings on the carrying tube, N —corresponding readings on the measuring rod. *Subject Headings: 1. Water level indicators 2. Water level measurement techniques.—I.L.D.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: Numerical forecasting textbooks (Brandejs), 10.3–3; Mathematics in meteorology (Naslin), 10.3–4; Ocean temperature effects on European synoptic processes (Pagava), 10.3–15; Winter weather types, Great Plains (Calef et al.), 10.3–19; Synoptic climatology, Hungary (Pécszeley), 10.3–22; Contrail forecasting, 10.3–29; Antarctic synoptic case histories (Van Loon), 10.3–53; Air route forecast studies, Dakar-Abidjan (Renard, Casanova), 10.3–82; Project Skyfire & lighting fires, (Barrows), 10.3–90; Forecasts for hydroelectric construction, Stalingrad (Nartysh), 10.3–91; Petroleum industry and degree-day forecasts (Sweeney), 10.3–93; Northwesterers in West Bengal and radar thunderstorm detection, Dum Dum Airport, Calcutta, (Das, Gangopadhyaya), 10.3–212; Synoptic conditions for cool summers (Bai-u), Japan (Ando), 10.3–221; Three-front models (Galloway), 10.3–237; Upper air analysis of squall development, Delhi (Bhalotra), 10.3–265; Synoptic conditions for sukhovei, Southern U.S.S.R. (Evseev), 10.3–268; Trough structure (Bai-u), Japan (Yoshino), 10.3–298.

10.3–155

551.509:519.24

Thompson, Jack C., (*Office of Met. Research, U. S. W. B., Wash., D. C.*), **Operations research looks at the weather forecast.** *Weatherwise*, Boston, 10(5):149–153, Oct. 1957.

3 photos, 9 refs. **DWB.** Also in: *National Conference on Applied Meteorology, Hartford, Conn., Oct. 1957, Proceedings*, issued 1957. Section D:1-9. 9 refs., 4 tables. **DWB (M A512pro)**—An abridgement of an article published in *Proceedings of the Conference on Applied Meteorology*, Hartford, Connecticut, October 28-29, 1957. Weather forecasting does not advance as rapidly as does observation and analysis since much of the observational material is of little or no use in forecasting. Methods of using the maximum information for decision making involve calculation of "expectancies" which may be based on pure climatology or may be refinements of existing forecast techniques. How operations research helps solve specific problems is discussed and illustrated. *Subject Headings:* 1. Operations research 2. Forecast improvement.—*M.R.*

10.3-156

551.509.1:621.394.3

New convenience for the busy forecaster's office: the Alden fully automatic continuous weather map recorder with Alfax paper. *American Meteorological Society, Bulletin*, 39 (2):123-124, Feb. 1958. 2 figs. **DWB, DLC**—Advertisement states that the weather map recorder is "a self contained, mobile unit that can be quickly installed by the operating personnel"—compact and can be plugged in to any AC outlet and a telephone junction. Operates automatically in TV station, office, trailer, school or barracks. No odors, fumes or dyes. Printing electrodes are on endless loops and need changing only once a month. It is possible to make duplicate or reduced size maps simultaneously. Recorder in use is illustrated. *Subject Headings:* 1. Facsimile weather map recorders 2. Alden automatic map recorders.—*M.R.*

10.3-157

551.509.2/3

Dzhordzhio, V. A., *Zadachi sinopticheskikh issledovaniĭ v Sredneĭ Azii*. [Problems of synoptic investigation in Central Asia.] (In: *Akademiia Nauk Uzbekskoi SSR. Institut Matematiki i Mekhaniki, Meteorologiya i gidrologiya v Uzbekistane*. Tashkent, 1955. p. 103-110.) **DLC**—The author discusses the principal problems facing the development of synoptic meteorology in Central Asia. The importance of a close association between theoretical and practical meteorology is stressed and the need for testing theoretical assumption by practice is illustrated with reference to erroneous advective dynamic analysis. The problems examined are the following: development of methods of long range forecasting (examination of the natural synoptic periods of S. T. PAGAVA, investigation of the climate near the ground, development of a more theoretical basis for long range forecasting, etc.); development of a hydrodynamic theory of forecasting and numerical methods of forecasting based upon it; study of the planetary frontal zones aloft and the associated jet streams; the origin and development of cyclones and precipitation forecasting; the influence of orography upon synoptic processes (large scale effect upon large circulation systems, effect upon cyclones and anticyclones and small scale effects such as föhn, strong winds in narrow mountain passes, etc.); and the structure of fronts and frontogenesis, and the closely associated transformation of air masses. Also, the special problems of local weather forecasting in various regions of Central Asia are discussed briefly. *Subject Headings:* 1. Synoptic meteorology 2. Long range forecasting 3. Atmospheric disturbances 4. Central Asia.—*I.L.D.*

10.3-158

551.509.2/3(09)

Kashin, K. I., *Razvitie sinopticheskoi meteorologii za 40 let*. [Forty years of development of synoptic meteorology.] *Meteorologiya i Gidrologiya*, Leningrad, No. 11:17-25, 1957. **DWB, DLC.** Trans. into English available. **DWB (M K19fo)**—During the 1930's, short range weather forecasting was entirely within the framework of frontal theory. Synoptic investigations involved characteristics of air masses and their classification; synoptic analysis was improved by utilizing characteristics of air masses, particularly weather situations associated with fronts and air masses, and the results of aerological analysis by means of pilot balloons. In 1937-1938, there began extensive use of aerological observations in synoptic analysis and also the use of baric topography charts, vertical atmospheric sections, etc. Studies were carried out, forecasting pressure changes by numerical means based upon extrapolation, calculation of future temperature and pressure fields by the use of thermodynamic and hydrodynamic equations (I. A. KIBEL'). Beginning with 1944-1945 research was conducted on changes in atmospheric pressure field and on vertical currents in the atmosphere,

both of which are associated with rainfall forecasting. At present, the use of high speed electronic computers in short range forecasting is being investigated. Long range forecasting began with the work of B. P. MUL'TANOVSKIĭ with its stress on natural synoptic seasons. G. IA VANGENGĖĭM developed a technique for long range forecasting for the Arctic on the basis of the interaction of basic forms of the atmospheric circulation. At present, monthly forecasts are based upon a method of forecasting mean monthly temperature analysis by means of hydrodynamic and thermodynamic equations; also the concept of rhythm of synoptic processes and the use of circulation index are being investigated for the purpose of long range forecasts. The effect of large anomalies within large areas on the development of synoptic processes and on temperature anomalies for particular time intervals are being investigated. *Subject Headings:* 1. History of synoptic meteorology 2. Synoptic meteorology 3. Weather forecasting.—I.L.D.

10.3-159

551.509.25:551.509.317

Meyer, H. K., *Betrachtungen über Höhenvorhersagekarten*. [Considerations on upper air prognostic charts.] *Germany. Deutscher Wetterdienst, Berichte*, 6(40), 1957. 20 p. 15 figs., 9 tables, 5 refs. DWB, DLC—After discussing 500 mb prognostic charts, the author deals with upper air charts and prognostic charts for the 300 and 200 mb levels. This study in a little known field shows that there are practical ways of improving the accuracy of 300 and 200 mb forecasts. Air traffic by jet aircraft will increase our knowledge of the position and development of the Atlantic jet stream. Considerable variations of tropopause height make it difficult to predict temperature at the mentioned levels. Temperature prediction above the tropopause is easier, due to the presence of air isothermal layer. It is also difficult to forecast turbulence and cloudiness for levels above 300 mb. *Subject Headings:* 1. Prognostic charts 2. Forecasting for 200 mb level 3. Forecasting for 300 mb level.—A.V. (trans. by G.T.)

10.3-160

551.509.25:551.509.5

Pettersen, Sverre (*Univ. of Chicago*), *A note on verification of prognostic charts*. *Tellus*, Stockholm, 9(3):313-315, Aug. 1957. 2 refs., 3 eqs. DWB, DLC—On the basis of an analysis of a sinusoidal pressure wave it is shown that correlations of observed and predicted changes while removing similarities due to persistence, also remove the measure of similarities resulting from the travel of pressure systems. In practice, the correlation of pressure (or height) changes would give high credit to forecasts in cases where the final state was out of phase with the initial state and it would discredit forecasts in which in-phase relationships were involved. It is also shown that verification by pressure (or height) changes gives undue credit to poor forecasts in cases where the distance travelled by the system is small in comparison with the dimensions. The usefulness of prognostic charts can be assessed readily from correlations of the agreement between the predicted and the observed pressure distribution. Forecast experiments are described in which the following verification measures are used: $R(PV)$ correlation coefficients between prognosticated and verifying pressures (or heights), $R(IV)$ correlation coefficients between the initial and verifying pressures, S —the relationship skill score as defined by $S = \frac{R(PV) - R(IV)}{1 - R(IV)}$, $R(\Delta)$ —correlation coefficient predicted and observed changes, E —the root-mean square error of the predicted changes, C —root-mean-square of observed changes, N —the number of occasions when $R(PV)$ exceeded $R(IV)$, M —number of occasions when E is less than C . *Subject Headings:* 1. Prognostic chart verification 2. Pressure changes 3. Skill score.—I.L.D.

10.3-161

551.509.3:519.24

*Essenwanger, Oskar; Horn, Lyle H. and Bryson, Reid A., *Half-hemispheric 500 mb topography description by means of orthogonal polynomials, Pt. 2, Specification*. Wisconsin Univ. Dept. of Meteorology, Contract AF 19(604)-992, Scientific Report, No. 11, March 1958. 16 p. 13 figs., numerous tables, 2 refs. DWB—The discussion of the polynomial representation of the 500 mb surface is continued. Certain corrections are made to Pt. I (computation) of this report, and the percentage reduction of variance attained by the twenty-two coefficients computed in that part examined in the light of these corrections. Additional terms are

computed to increase the reduction of variance, and from these terms forty-two are selected as a set of working coefficients. (For Pt. 1, **Computation** (by BRYSON and KUHN), see 8.3-202, March 1957, *MAB.*) *Subject Headings:* 1. Statistical forecasting 2. Orthogonal polynomial functions.—*Authors' abstract.*

10.3-162

551.509.3:512.8

Sugii, A. (*Takamatsu Met. Obs.*), **Application of matrix as an operator to meteorology.** *Geophysical Magazine*, Tokyo, 27(3):353-360, Sept. 1956. 9 figs., 16 eqs. DWB, DLC. Also in *Journal of Meteorological Research*, Tokyo, 9(8):609-610, Aug. 1957. 2 figs., eqs. In Japanese. DWB. See also: [Comments on] A. Sugii: Application of . . . [and] Reply by Sugii. *Journal of Meteorological Research*, Tokyo, 10(8):718-719, Aug. 1958. 5 refs., 2 eqs. In Japanese. **DLC**—In this paper the author tried to characterize the field of meteorological elements with the values at grid-points, when the meteorological elements are distributed two-dimensionally and change with time. These values at grid-points are represented by the matrix and extrapolated. As an example, this method is applied to the extrapolation of the 5-day mean of 700 mb heights. In this way, two fields of the 5-day mean of 700 mb heights are analyzed: fields of zonal and meridional gradients of mean 700 mb heights. A numerical example using the data of October 1953 is shown. *Subject Headings:* 1. Weather forecasting 2. Matrices 3. Extrapolation.—*Author's abstract.*

10.3-163

551.551:551.509.312

Shuman, Frederick G. (*U. S. W. B.*), **Predictive consequences of certain physical inconsistencies in the geostrophic barotropic model.** *Monthly Weather Review*, Wash., D. C., 85(7):229-234, July 1957. 7 figs., 8 refs., 14 eqs. DWB, DLC—The physical inconsistency of geostrophic flow and small surface pressure tendencies is discussed. The frequently disastrous consequences in conventional geostrophic barotropic predictions are numerically identified by comparisons with experimental "semi-geostrophic" barotropic predictions from which the inconsistency has been removed. Effects of the inconsistency of the geostrophic wind field with the equations of motion are also quantitatively isolated by comparisons of semi-geostrophic predictions with predictions made with wind fields which satisfy the balance equation. It is concluded that the principal fault of the conventional geostrophic approximation lies in the violation of the continuity equation. Its lack of the dynamic effects expressed in the equations of motion seems also significant, but is less important. *Subject Headings:* 1. Geostrophic approximation 2. Barotropic tendency computation 3. Geostrophic wind field.—*Author's abstract.*

10.3-164

551.513.1:551.509.312

§Vederman, Joseph and Hubert, William E. (*both, Joint Numerical Wea. Prediction Unit, Suitland, Md.*), **On the conservation of finite-difference absolute vorticity in barotropic forecasts.** *Monthly Weather Review*, Wash., D. C., 85(6):193-199, June 1957. 6 figs., 3 tables, 4 refs., 6 eqs. DWB, DLC—In solving the differential equations used in numerical weather prediction, one resorts to the use of finite-difference techniques. In the barotropic model it is assumed that the absolute vorticity is conserved. Even though the differential form of the vorticity equation insures conservation, the finite-difference form may not. The purpose of this study is to test this assumption in order to find out how serious truncation errors really are. The results indicate that the finite-difference absolute vorticity is reasonably well conserved, at least up to 48 hrs. *Subject Headings:* 1. Numerical forecasting techniques 2. Finite-difference absolute vorticity.—*Authors' abstract.*

10.3-165

551.511.32:551.509.313

Árnason, Geirmundur (*Joint Numerical Weather Prediction Unit*), **A convergent method for solving the balance equation.** *Journal of Meteorology*, Boston, 15(2):220-225, April 1958. 1 fig., 8 refs., 17 eqs. DWB, DLC—The nonlinear balance equation is replaced by an infinite system of linear differential equations. This system has a series of solutions which under certain conditions converge toward the solution of the balance equation. It is shown that these conditions coincide with the conditions for ellipticity of the balance equation. A slightly different method of solution is shown to diverge. This is illustrated by a case where the

sequence of approximate solutions is compared with the solution of the balance equation. (For abstract on this from another source, see 8F-5, June 1957, *MAB.*) *Subject Headings:* 1. Numerical forecasting 2. Balance equation.—*Author's abstract.*

10.3-166

551.509.313:551.511:551.513.1

Bring, A. and Charasch, Eliahu, **An experiment in numerical prediction with two non-geostrophic barotropic models.** *Tellus*, Stockholm, 10(1):88-94, Feb. 1958. 2 figs., table, 6 refs., 32 eqs. **DWB, DLC**—The result of a test with two simple nongeostrophic barotropic models are discussed. One of these models is based on ideas presented in a previous article (CHARASCH, 1957). The forecasts obtained are found to differ significantly from forecasts obtained with the quasigeostrophic model. Both nongeostrophic models appear to be free from one major weakness of the nongeostrophic model, i.e., the hypertrophy of anticyclones. It is suggested that the disappointing forecasting performance of baroclinic models hitherto to a considerable degree springs from a similar weakness as exposed here in the quasi-geostrophic barotropic model. *Subject Headings:* 1. Numerical forecasting techniques 2. Barotropic models.—*Authors' abstract.*

10.3-167

551.509.313:551.542

†Chaplygina, A. S., **O chislennykh metodakh prognoza baricheskogo polia v atmosfere.** [Numerical methods of forecasting the atmospheric pressure field.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:823-826, June 1957. 2 tables, 24 refs., 3 eqs. **DLC**—An attempt is made to systematize the data on numerical forecasting published during 1951-56 in order to determine the degree of success of different methods in forecasting the pressure field in the middle troposphere (forecasting changes in 500 mb surface). The coefficients of correlation between prognostic and actual variations at AT 500 obtained by methods of forecasting for the same initial data and the mean correlation coefficients between actual and forecast variations of AT 500 for different forecasting methods are presented in tables. The results obtained with various models are analyzed. It is concluded that the experimental forecasts published in the meteorological literature outside the U.S.S.R. show that the precision of forecasting the pressure field at AT 500 by numerical methods are more exact than those obtained by usual synoptic forecasting. *Subject Headings:* 1. Numerical pressure field forecasting 2. Forecast verification 3. Forecast accuracy.—*I.L.D.*

10.3-168

551.509.313:551.511:551.513.1

Charasch, Eliahu, **Note on numerical prediction of intensity changes of disturbances with the aid of the quasi-geostrophic barotropic model.** *Tellus*, Stockholm, 10(1):95-98, Feb. 1958. 6 refs., 8 eqs. **DWB, DLC**—It is shown by a simple analysis that the introduction of a small but systematic error in the evaluation of vorticity causes a significant aberration in the conversion process between disturbance and basic flow kinetic energy in barotropic motion. The neglect of the variation of the coriolis parameter in the geostrophic vorticity is shown to be responsible for large errors in the prediction of the intensity changes taking place in a barotropic model. *Subject Headings:* 1. Numerical forecasting 2. Barotropic models 3. Vorticity computation errors.—*Author's abstract.*

10.3-169

551.509.313

Chen, Yung-san et al. (*Inst. of Geophys. and Met., Academia Sinica*), **A test of two-parameter model for a situation with a strong front.** *Acta Meteorologica Sinica*, Peking, 28(4):275-281, 1957. 7 figs., 5 refs., 6 eqs. In Chinese; English summary p. 281. **DLC**—The development of a situation with strong front in the Far East is computed as a test for the two-parameter model in $(xy\theta-t)$ system. It is found that the result is better than that obtained from a two-parameter model in $(xyp-t)$ system, as the front is better represented in the former model. However difficulty exists with regard to the boundary condition in $(xy\theta-t)$ system. *Subject Heading:* 1. Numerical forecasting.—*Author's abstract.*

10.3-170

551.509.313:551.513.1:551.509.5

Cressman, G. P. (*Air Weather Service*), and Hubert, W. E. (*United States Navy*), **A study of numerical forecasting errors.** *Monthly Weather Review*, Wash., D. C., 85(7):235-242,

July 1957. 15 figs., 6 refs. **DWB, DLC**—Studies of numerical forecasting errors have revealed that the principal difficulties encountered in models currently operational at the Joint Numerical Weather Prediction Unit arise from errors in the 500 mb forecasts. These errors are common to both barotropic and baroclinic models. The errors in the 1000–500 mb thickness forecasts are considerably smaller. Results show that systematic errors are introduced (1) by the use of the geostrophic approximation and (2) by the approximations used on the boundaries. The cases presented in this paper show that the first type of error is virtually nonexistent in nongeostrophic, barotropic forecasts. Boundary errors are particularly serious in cases where the boundaries are meteorologically active, suggesting the future use of hemispheric forecast grids. The elimination of these two types of errors from all forecasts appears to be essential before the smaller errors, such as truncation errors and errors due to baroclinic development, nonadiabatic effects, etc., can be isolated and studied satisfactorily. *Subject Headings:* 1. Numerical forecasting errors 2. Barotropic models 3. Baroclinic models 4. Geostrophic approximation.—*Authors' abstract.*

10.3-171

551.509.327:551.515.23 (267.4)

Chakravorty, K. C. and Basu, S. C. (*both, Met. Dept., India*), **How to predict recurvature of storms in the Bay of Bengal.** (In: Tropical Cyclone Symposium, Brisbane, Dec. 1956, *Proceedings*, pub. Dec. 1956. p. 359–365. 2 figs., 2 tables, 8 refs.) **DWB.** Also their: **Note on the factors useful for the prediction of recurvature of storms in the Bay of Bengal.** *Indian Journal of Meteorology and Geophysics*, Delhi, 8(3):302–308, July 1957. 2 figs., 2 tables, 8 refs. **DWB, DLC**—Practical rules are set forth for predicting recurvature of tropical cyclones in the Bay of Bengal. Theory, frequencies (1945–54) by months of storms and of storms which recurved, geographical distribution (2° squares), tracks of all recurving storms, pressure fields and changes before recurvature, precipitation and cloud fields, influence of anticyclones, upper air structure and speed of movement of recurving storms are discussed and illustrated. *Subject Headings:* 1. Cyclones, Bay of Bengal 2. Tropical cyclone forecasting 3. Recurvature of tropical cyclones 4. Bay of Bengal, India.—*M.R.*

10.3-172

551.509.327:551.515.2

551.511.32:551.515.2

Fukaya, T., **On the relationship between vorticity tendency field and typhoon track.** *Journal of Meteorological Research*, Tokyo, 9(9):648–651, Sept. 1957. 12 figs., 4 refs., 2 eqs. In Japanese; English summary p. 648. **DWB, DLC**—The relationship between the distribution of 24-hr variation of vorticity at 700 mb level and the track of typhoon was examined from the analytical point of view, and the author pointed out that the vorticity tendency field can be divided into two different types for the purpose of forecasting the typhoon movement. *Subject Headings:* 1. Typhoon movement forecasting 2. Vorticity-typhoon track relationships 3. Vorticity in typhoons.—*Author's abstract.*

10.3-173

551.509.327:551.515.13 (26)

†George, J. J. (*Eastern Air Lines, Inc.*); Wolff, P. M. and Somervell, W. L., Jr. (*both, Bureau of Aeronautics Project AROWA*), **The prediction of maritime cyclones.** *Journal of Meteorology*, Boston, 15(2):202–209, April 1958. 17 figs., 16 refs. **DWB, DLC**—An empirically derived method is presented for objectively predicting the 24-hr movement and change in intensity of maritime cyclones. The technique developed requires only measurement of the 500 mb height and temperature gradients above the current sea level center, and determination of the type of 500 mb flow within which the surface system is embedded. *Subject Headings:* 1. Cyclone movement forecasting 2. Maritime cyclones.—*Author's abstract.*

10.3-174

551.509.327:551.515.1

Mori, S. and Nomoto, S., **Objective analysis of the relationship between winds aloft over Naze and cyclones at the East China Sea in winter.** *Journal of Meteorological Research*, Tokyo, 9(9):642–647, Sept. 1957. 10 figs., 3 tables, ref., eqs. In Japanese; English summary p. 642. **DWB, DLC**—The authors examined the relationship between winds aloft over Naze and cyclogenesis of so-called "Taiwan-bozu" generated in the East China Sea area in winter. This method of analysis is highly objective, and the results are helpful for forecasting "Taiwan-bozu." *Subject Headings:* 1. Winds aloft-cyclogenesis relationships 2. Objective analysis

3. Objective "Taiwan-bozu" forecasting 4. Naze, Japan 5. East China Sea.—*Authors' abstract.*

WEATHER MODIFICATION

See also: Forest fire control by cloud modification (Barrows et al.), 10.3-90.

10.3-175

551.509.61

Ackerman, Edward A., **Design study for economic analysis of weather modification.** [In: U. S. Advisory Committee on Weather Control, **Final Report, 1957.** 2:235-245. fig. (fold. map), 15 refs.] **DWB, DLC**—After considering the single purpose type of appraisal of the results of weather modification, the author presents the reasons for the need of economic analysis from a public point of view, namely the wide territorial scope of weather modification, the harmful results that may accompany the benefits derived from weather modification, the size of the expected U. S. population and its future distribution, etc. This is followed by an analysis of the design of studies treating the economic effects of weather modification and an outline of the desirable objectives of an economic study. Such studies are to be made in the light of three distinct levels of possible weather control, namely: (1) the economics of near future practical application of weather modification; (2) the economic opportunity for the application of known techniques and (3) near future practical applications. The possible procedures in carrying out economic studies on these three levels of weather modification possibilities are presented in considerable detail. The determination of costs; pilot study of "disbenefits"; quantitative evaluation of the complex of water affected economic pursuits of a given area; the assumptions underlying a study; availability of data for studying economic opportunity for weather modification; the economic implications of diverting, phasing or otherwise altering continental air masses; the possible economic aspects of now speculative but potentially revolutionary weather modification studies, etc. *Subject Headings:* 1. **Weather modification** 2. **Economic aspects of weather modification.**—*I.L.D.*

10.3-176

551.509.616:551.576.11

*Chuvaev, A. P., **Ob usloviiakh blagopriiatnykh dlia iskusstvennogo vyzyvaniia osadkov iz moshchnykh kuchevykh oblakov.** [Favorable conditions for the artificial production of precipitation from heavy cumulus clouds.] *Meteorologiya i Gidrologiya*, No. 11:15-20, Nov. 1956. 2 figs., 2 tables, 7 refs. **DWB, DLC**—The most essential characteristics of cumulus congestus clouds are analyzed on the basis of observations made during airplane flights in northwestern regions of European U.S.S.R. and in southern European U.S.S.R. Data are presented in frequency of different vertical thicknesses of Cu congestus clouds and frequency of temperatures of the upper boundaries of Cu congestus clouds. The data indicate that, in southern regions of the U.S.S.R., the frequent occurrence of Cu congestus clouds make it possible to obtain by artificial means precipitation of economic significance. *Subject Headings:* 1. **Artificial precipitation** 2. **Cloud seeding** 3. **Cumulus clouds** 4. **European U.S.S.R.**—*I.L.D.*

10.3-177

551.509.616:551.576.11

Chuvaev, A. P.; Tarasov, A. V.; Titov, N. A. and Nikandrova, G. T., **Opyt regulirovaniia razvitiia oblakov moshchnoi konveksii nad znachitel'noi ploschad'iu.** [Experiment in regulating the development of convective clouds over a large area.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, 72:127-133, 1957. 7 figs. **DLC**—A report on a successful field experiment to prevent the development of thunderstorm cells by seeding a large convective cloud having supercooled tops with dry ice from a high-speed airplane on June 20, 1956 in the region of Minsk. The seeding of 65 kg of finely crushed dry ice was carried out in three 40 km long flights across the 40×15 km cloud field, at 4500 m height in 20 min. Forty-seven minutes after the seeding began, the cumulus cloud with a 2500×3000 m vertical development had almost disappeared. A series of photos show diverse stages of the cloud's disintegration. *Subject Headings:* 1. **Convective cloud seeding** 2. **Cloud dispersal** 3. **Minsk, U.S.S.R.**—*A.M.P.*

10.3-178

551.509.617:551.576.11

Chuvaev, A. P., *Ob osobennostiakh metodiki vozdeistvii "sukhim l'dom" na konvektivnye oblaka s tsel'iu vyzvaniia iz nikh osadkov.* [Characteristics of the method of influencing convective clouds by dry ice in order to produce precipitation.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 72:110-117, 1957. 5 figs., 15 refs. **DLC**—On the basis of an experiment carried out on June 1, 1956 in the Kiev Region, the author describes an effective method of seeding small particles of solid CO₂ at the rate of 2.0-2.5 kg per flight-km in the crest of convective clouds and obtaining substantial precipitation, even when the lower cloud limit is relatively high (2000 m) the vertical development is not great (2000 m), and the upper cloud limit reaches only the lower boundary of the effective supercooling zone. The paper concludes with the assertion that although cumulus clouds often have no icing in their tops and do not produce natural precipitation, they can be easily triggered by appropriate methods of seeding. *Subject Headings: 1. Cloud seeding with dry ice 2. Kiev Region, U.S.S.R.—A.M.P.*

10.3-179

551.509.617:551.576.11

*Roulleau, J., *Le contrôle des expériences de pluie provoquée.* [Evaluation of artificial precipitation experiments.] *La Météorologie*, Paris, Ser. 4, No. 44:319-338, Oct./Dec., 1956. 16 figs., 7 tables. French, English and Spanish summaries p. 319. **DWB**—In order to determine the effectiveness of direct seeding to produce rainfall it is necessary to know the minimum amount of artificial rain produced and the amount of rain produced by an experiment. The answer depends upon a knowledge of the amount of natural rain occurring at a given point or within a given zone; this can be determined either by an analysis of the historical rain data at the given point (comparison in time) or by the rain characteristics of neighboring points (comparison in space). The time comparison method is applied to an analysis of the rainfall at Saint-Maur. Data are presented on annual deviations from the mean, secular variations of mean values, deviations between successive periods and deviations between alternate periods. On the basis of this analysis it is concluded that the effects of artificial cloud seeding can only be noted if very unusual amounts of additional rainfall are produced. The method of spatial comparison involving experimental and control points is carried out for six zones ranging in area from 1200 km² to 3500 km², using four to eight stations within each zone. An analysis of the temporal variation of rainfall amounts for two zones (1949-1955) and of the influence of distance of comparison zones upon rainfall amounts is presented and the significant amounts of induced rainfall are determined. It is concluded that the comparison of target and control zones seems to be the best method for studying artificially induced rainfall and yields most exact results provided that the choice of zones has been made on the basis of a preliminary climatic analysis. *Subject Headings: 1. Cloud seeding evaluation 2. Rainfall data analysis 3. Saint-Maur, France.—I.L.D.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

COMPOSITION OF THE ATMOSPHERE

10.3-180

551.510:551.513:523.4 551.511.33:532.2

Royal Meteorological Society and Royal Astronomical Society, *Planetary atmospheres and convection in rotating fluids: a symposium held at Burlington House on May 23-24, 1957.* 14 p. Mimeo. (Abstracts of papers presented at the Symposium.) Also: Davies, T. V., *Planetary atmospheres and convection in rotating fluids.* *Nature*, London, 180(4600):1455-1461, Dec. 28, 1957. **DWB, DLC**—DAVIES article is a detailed summary of the papers delivered at a symposium on *Planetary Atmospheres and Convection in Rotating Fluids* of the Royal Meteorological Society and the Royal Astronomical Society, London May 23-24 1957. Introductory address was by SIR HAROLD JEFFREYS. Other papers presented were: Kopal, Zdenek: *The basic observational data on planetary atmospheres.* Sheppard, P. A.: *The general circulation of the outer planets.* Tucker, G. B.: *Transfer processes in planetary atmospheres.* Hide, Raymond: *Experiments on convection in rotating fluids.* Goody, R. M.:

The thermal structure of Mars. Urey, H. C.: The escape of planetary atmospheres. Sutcliffe, R. C.: The influence of condensation on planetary atmospheres. Sawyer, J. S.: Jet streams in the earth's atmosphere. Davies, T. V.: The theory of the experiments on convection in rotating fluids. Charney, J. C.: Theory of the general circulation of the atmosphere. Eady, E. T.: The physical parameters characterizing the dynamics of planetary atmospheres. SIR HAROLD JEFFREYS outlined the historical development of the problem of the circulation patterns which can develop in a fluid on a rotating sphere beginning with the work of MARGULES and the development of the problem on the onset of convection in rotating fluids beginning with the work of BÉNARD (1900). KOPAL's paper discussed spectrometer and photometer techniques. The gaseous constituents of the atmospheres and some possible temperature ranges were considered. LIDTHILL discussed the general theoretical aspects of the concept of diffusion, the restriction of the width of the Gulf Stream to 100 km over long stretches in water; the coherence of the atmospheric jet stream in the presence of turbulent transfer and the up-gradient flow of westerly angular momentum in low latitudes. SHEPPARD summed up the main problems dominating the discussions—showing the evidence for the presence of jet streams in other planets and in experimentally simulated atmospheres, the origin and maintenance of the jet stream, etc. *Subject Headings:* 1. Planetary atmospheres 2. Planetary circulation 3. Convection in rotating fluids 4. Jet stream.—*I.L.D.*

10.3-181

551.510.41:546.264

Callendar, G. S., Effect of fuel combustion on the amount of carbon dioxide in the atmosphere. *Tellus*, Stockholm, 9(3):421-422, Aug. 1957. 6 refs. DWB, DLC—The author discusses the large discrepancy between recently measured depressions of the radiocarbon activity ("Suess effect") and the apparent increase in atmospheric CO₂ as given by the measurements of this quantity between 1870 and 1935. It is suggested that part of the active CO₂ exchange reservoir constituting the land biosphere and humus may be considerably smaller and slower than supposed and that a meteorological cause is suggested for some of the relatively high CO₂ observed in the 1930's. Also, an oceanic cause may be suggested in that the average surface temperature of the N.E. Atlantic rose by nearly 1°C between the 1920's and 1930's. The series of CO₂ observations of FONSELIUS and KOROLEFF (1955-57) may be related to meteorological-biological factors (rapid decomposition of organic residue in warm July-Sept. 1955, CO₂ average of 349 p.p.m. and the similar wet cool period of 1956, 322 p.p.m.). The possibility that the increase between 1915-1956 of 36 p.p.m. above the best computed for 19th century average can be explained by the combustion of fossil fuel, and the possible climatic effects of CO₂ are discussed. *Subject Headings:* 1. Carbon dioxide in the atmosphere 2. Carbon dioxide variations.—*I.L.D.*

10.3-182

551.510.41:551.510.53:551.507.362.1:535.33

Meadows, Edith B. and Townsend, John W., Jr., Neutral gas composition of the upper atmosphere by a rocket-borne mass spectrometer. *Journal of Geophysical Research*, Wash., D. C., 61(3):576-577, Sept. 1956. fig., 2 foot-refs. DLC—The composition was measured between 74 and 142 km. Near 85 km, gases tentatively identified as nitrogen dioxide and sodium were detected. The spectrum at 84 km showed the following gases: Carbon dioxide at mass number 44, argon at 40, oxygen at 32 and 16, nitrogen at 28 and 14 and water vapor at 18, nitrogen dioxide (?) at 46 and sodium (?) at 23. The peaks at 23 and 46 were detected between 88 and 80 km and between 90 and 75 km, respectively. *Subject Headings:* 1. Upper atmosphere composition 2. Rocket spectrometer measurements 3. New Mexico.—*S. Fritz.*

10.3-183

551.510.41:06

Neumann, Georg Hugo, Fourth Annual Conference in Atmospheric Chemistry, May 20-22, 1957. *Tellus*, Stockholm, 10(1):165-169, Feb. 1958. DWB, DLC—The fourth in a series of informal conferences on atmospheric chemistry was held at the International Meteorological Institute in Stockholm, May 20-22, 1957. The first two days were devoted to lectures and discussions at the Institute in Stockholm, whereas the third day was traditionally spent at the Royal Agricultural College in Ultuna. *Subject Headings:* 1. Atmospheric chemistry conferences 2. Stockholm, Sweden.—*Author's abstract.*

ATMOSPHERIC POLLUTION

See also: Atmospheric pollution, Wrocław, Poland (Ołpińska, Słomka), 10.3-21.

10.3-184

551.510.42:551.511.6

Cramer, Harrison E. (*Round Hill Field Station, M.I.T.*), **A practical method for estimating the dispersal of atmospheric contaminants.** *National Conference on Applied Meteorology, Hartford, Conn., Oct. 1957. Proceedings, issued 1957. Section C:33-55. 13 refs., 7 tables, 17 figs., 12 eqs.* DWB (M A512pro)—The paper first summarizes the results of recent diffusion experiments at Round Hill and at a field site near O'Neill, Nebr. These data provide a comprehensive picture of the probable variations in basic diffusion parameters, over travel distances of the order of 1 km, in all conditions of thermal stratification; usefulness of direct meteorological indicators (the standard deviations of azimuth and elevation angle) in obtaining satisfactory estimates of dispersal is emphasized. A simple diffusion model, based in part on the above results, is then described and a complete set of diffusion equations derived; these are applicable to elevated as well as ground-level sources. The equations are closely similar in form to those of O. G. SUTTON and differ principally in the substitution of the direct meteorological indicators mentioned above for generalized diffusion coefficients derived from the vertical profile of mean wind speed; and, in the absence of restriction on the value of the power-law exponent in travel distance. Finally, the paper describes techniques for estimating diffusion from elevated sources and provides quantitative estimates of dispersal for a wide range of thermal stratification. It appears that SUTTON's values for maximum ground-level concentration are reliable first approximations in all conditions of thermal stratification. *Subject Headings: 1. Atmospheric pollution dispersal 2. Atmospheric diffusion 3. Diffusion equations.—Author's abstract.*

10.3-185

551.510.42

Dunskii, V. F., **Vliianie meteorologicheskogo faktora i rastitel'nogo pokrova na rasprostraneniye aerazolei v prizemnom sloe vozdukha.** [Influence of meteorological factors and vegetation on the distribution of aerosols in the atmospheric layer near the ground.] *Meteorologiya i Gidrologiya*, No. 4:24-28, April 1956. 4 figs., 3 refs. Trans. into English available Special Libraries Association, Trans. Center (John Crerar Library, Chicago) as its R-4585 (14 p.). DWB, DLC—With reference to the use of insecticides which form aerosols, the author analyzes the conditions under which work with aerosols is impossible or useless owing to the complete or partial rise of the aerosol cloud above the vegetation. The equation for calculating the upward movement of the aerosol cloud is

$$K_1 = \frac{0.16\mu_1}{l_n \frac{1}{z_0}} \left[1 + 7.5 \frac{\Delta T}{U_1^2} \right],$$

where K_1 —coefficient of movement of cloud one meter upward; μ_1 —mean wind velocity at 1 m, T —temperature difference between 2 m and 0.5 m and z_0 —roughness parameter. Experiments were carried out to determine R_i —Richardson's criterion and $A=f(K)$ where A is the probability of the separation of aerosol cloud from surface which may depend upon the intensity of turbulent diffusion under conditions of stability. Graphs showing the dependence of A upon R_i and of A upon K_1 ; the dependence of the height of the upper boundary of the oil vapor cloud upon R_i and the dependence of A upon μ_1 are presented. *Subject Headings: 1. Aerosol distribution 2. Insecticide spraying.—I.L.D.*

10.3-186

551.510.42

Grisollet, H. and Pelletier, J., **La pollution atmosphérique au centre de Paris et ses relations avec quelques facteurs climatologiques.** [Atmospheric pollution in the center of Paris and its relation to some climatological factors.] *La Météorologie*, Paris, Ser. 4, No. 47:393-418, July/Sept. 1957. 3 figs., 21 tables, 15 refs. French, English and Spanish summaries p. 393. DWB—This comprehensive study of the extent of atmospheric pollution in the center of Paris is based on the analysis of samples of air taken at a height of four meters above the ground in the street Marché des Blancs-Montaux on the level of the first floor and at the top

of the Tour Saint-Jacques. Daily measurements were made of CO_2 , SO_2 and fine dust content of the atmosphere. The contents of this study are as follows: a detailed account of the methods used to measure the pollutants, the correlation between the annual variation of these three atmospheric pollutants; seasonal and weekly values of pollution level; effect of precipitation, temperature and wind velocity on pollution level; the influence of morning temperature inversions between the top of La Tour Saint-Jacques and the ground on pollution level; the relationship between air pollution and air masses; a comparison between pollution measured in the vicinity of the ground and at the summit of the Tour Saint-Jacques; a comparison of the present CO_2 content of the atmosphere of Paris with that observed 50 yrs ago; and an approximate evaluation of the different sources of pollution in Paris. Extensive numerical data are presented. A close correlation exists between daily amount of CO_2 , SO_2 and fumes. The pollution is a maximum at the end of the week and at a minimum on Sunday. Precipitation has a purifying effect except in the case of a series of many rainy days. Temperature inversions during summer mornings and in the presence of Cd air masses in winter are accompanied by increased pollution, etc. *Subject Headings:* 1. Atmospheric pollution studies 2. Inversion effects on atmospheric pollution 3. Atmospheric pollutants 4. Paris, France. —I.L.D.

10.3-187

551.510.42

Larson, Gordon P. (*Oxy-Catalyst, Inc., Wayne, Pa.*), **A progress report on controlling atmospheric pollutants.** *Air Pollution Control Association, Pittsburgh, Pa., Journal*, 7(4):302-307, Feb. 1958. 2 tables. **DWB, DLC**—Air pollution problems are the result of our national industrial technology. A review of their control activities in 1957 shows a record of six million dollars expended in research work, and over 200 governmental agencies set up in different communities. In Utah, California, Washington and Texas, the American Smelting and Refining Company has successfully reduced dust and fume, sulfur dioxide and fluoride contaminants in the air. *Subject Headings:* 1. Atmospheric pollution control 2. United States. —N.N.

10.3-188

551.510.42:551.575.1/2

Mikirov, A. E., **O vozmozhnosti razdel'nogo izucheniia spektra raspredeleniia chastits zhidkoĭ i tverdoĭ fraktsii aerolei.** [The possibility of an analytical study of the distribution spectrum of particles of liquid and solid fractions of aerosols.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:689-691, 1957. 3 tables, 7 refs., eq. **DLC**—A method is presented for employing indices of scattering for simultaneous but separate measurement of the number and dimensions of liquid and solid aerosol particles. The use of an electric photometer for this purpose is described and the results of measurements are presented. *Subject Headings:* 1. Photoelectric photometers 2. Aerosol particle spectrum.—I.L.D.

10.3-189

551.510.42:546.16

Semrau, Konrad T. (*Stanford Res. Inst., Menlo Park, Calif.*), **Emission of fluorides from industrial processes: review.** *Air Pollution Control Association, Journal*, 7(2):92-108, August 1957. 3 figs., 5 tables, 130 refs., eqs. **DWB, DLC**—Fluorine contaminants from industrial processes are traced back to atmospheric fluorine compounds. Plants, animals and minerals absorb atmospheric fluorine. But atmospheric pollution by fluorides involves gaseous compounds, and dusts, or fumes emitted from various processing plants. *Subject Headings:* 1. Atmospheric pollution 2. Industrial waste gases 3. Fluorides.—N.N.

10.3-190

551.510.42:546.26

Shaw, J. H., **Abundance of atmospheric CO above Columbus, Ohio.** Ohio State Univ. Research Foundation, Contract AF 19(604)-1003, March 1957. 49 p. 9 figs., 11 tables, 15 refs., 22 eqs. **DWB**—An average CO content of approximately 0.06 atmo-cm/air mass has been found for the atmosphere above Columbus, Ohio, during 1952-53 from measurements of the lines R(2) and R(3) of the 4.74 fundamental band appearing in the solar spectrum. There is evidence for some increase in CO content on occasional days during the colder months of the year, but because both the CO lines measured are contaminated by H_2O absorption it is not possible to be sure that similar variations also occur during the summer months. There

appears to be no correlation between high CO content and other atmospheric conditions except during the period Oct. 20–Nov. 13, 1952 when a dependence of CO abundance on visibility was noted. During this period, the worst forest fires for 20 yrs were burning in southeastern Ohio and states farther south. The present data are compared with the results of other workers. *Subject Headings:* 1. Carbon monoxide in the atmosphere 2. Columbus, Ohio.—*Author's abstract.*

10.3–191

551.510.42:551.511.13:536.711:533.15

Tank, William G., **Atmospheric stability criteria for determining the effectiveness of agent releases in establishing ground level contamination.** *U. S. Dugway Proving Ground, Utah, DPGRR*, No. 11, Feb. 1957. 44 p. 11 figs., 47 eqs. **DWB**—Tests made at Dugway Proving Ground, Utah, showed that where the potential temperature decreased with height above the ground, the gaseous contaminants released by small explosions were carried to great heights, and hence ground contamination was small. On the other hand, where potential temperature increased with height, the contamination at the ground was heavy. Eleven graphs show soundings of potential temperature to 10 or 25 m, and dosage distribution theory is worked out extensively. Temperature measurements must be made at frequent intervals or important layers may be overlooked in predicting ground dosages. *Subject Headings:* 1. Stability effects on contamination 2. Diffusion of gases 3. Potential temperature 4. Dugway Proving Grounds, Utah.—*M.R.*

10.3–192

551.510.42:576.095

Woodcock, Alfred H. (*Woods Hole Oceanog. Inst., Woods Hole, Mass.*), **Bursting bubbles and air pollution.** *Sewage and Industrial Wastes*, 27(10):1189–1192, Oct. 1955. 2 figs., 17 refs. **DWB, DLC.** Also issued as: Woods Hole Oceanographic Institution, Woods Hole, Mass. Contract Nonr-798(00), [Pt. 3 of] Technical Report, No. 12, March 1956.—The author believes that the bubble-jet-droplet mechanism demonstrated over ocean waves may be responsible for injecting harmful as well as harmless bacteria into the air over bodies of water. It is shown that extremely thin films of oil or contaminating matter can be completely removed from a water surface which is otherwise uncontaminated. Air-borne bacteria can survive drying up of the original droplets. The bubbles may be produced by fallout raindrops, snowflakes, etc. as well as by whitecaps. Millions of pathogens might thus be introduced into a small area of atmosphere. *Subject Headings:* 1. Aerobiology 2. Bubble bursting of contaminated water.—*M.R.*

STRUCTURE OF ATMOSPHERE—UPPER ATMOSPHERE—IONOSPHERE

See also: Circulation index changes (Defant, Taba), 10.3–23; Ionospheric prediction manuals (de Maximy), 10.3–28; Ionosphere IGY program, Arctic (Shapley), 10.3–38; Upper air research (Fedorov), 10.3–132; Satellite orbits and outer atmosphere (Nonweiler), 10.3–133; Upper atmosphere composition, New Mexico (Meadows, Townsend), 10.3–182.

10.3–193

551.510.5

Krasovskii, V. I., **Izuchenie verkhnei atmosfery.** [Upper atmosphere research.] *Priroda*, Moscow, 46(5):55–60, May 1957. 5 figs. **DLC**—An informative article giving the latest information on upper atmospheric and ionospheric research at the newly formed (1956) Institute for Physics of the Atmosphere of the Academy of Sciences in Moscow. Auroral physics, airglow, noctilucent clouds, radio reflection from aurora and ionosphere, auroral photography (even moving picture photography for determination of velocity of drift, etc.), ionospheric propagation and recombination, spectroscopy, etc. are discussed at some length and illustrated. *Subject Headings:* 1. Upper atmosphere research 2. U.S.S.R.—*M.R.*

10.3–194

551.510.5

Krasovskii, V. I., **Pervye rezul'taty nabludenii verkhnei atmosfery.** [First results of upper atmosphere research.] *Priroda*, Moscow, 46(12):87–88, Dec. 1957. **DLC.** Trans. by E. R. Hope, issued as *Canada. Defense Research Board, Translation 278 R*, Jan. 1958.

English Trans. available from Special Libraries Association Translation Center (John Crerar Library, Chicago), as its R-3454.—The Institute of Physics of the Atmosphere on the Academy of Sciences (U.S.S.R.) has begun its upper atmospheric research according to the IGY program at three of its stations—at Loparskaia near Murmansk, at Roshchino near Leningrad, and at Zvenigorod near Moscow. Observations of upper atmosphere emissions and radar reflections from auroras are being successfully carried out. The investigations deal mainly with the elementary microprocesses of the upper atmosphere and the nature of the agents disturbing it. *Subject Headings: 1. Upper atmosphere research 2. U.S.S.R.—A.M.P.*

10.3-195

551.510.5

†Mikhnevich, V. V. and Khvostikov, I. A., *Izuchenie vysokikh sloev atmosfery*. [The study of the upper layers of the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 11:1393-1409, 1957. 6 figs. (incl. photos, graphs), 5 tables, 78 refs. **DWB**. English Trans. available from Special Libraries Association Translation Center (John Crerar Library, Chicago), as its R-3475.—While this review is primarily devoted to the contributions of Soviet scientists to the investigations of the upper atmosphere during the past 40 yrs, it is also a summary of the general progress in this field during the same period. The author discusses present knowledge of the structure and constitution of the atmosphere including temperature at altitudes up to 100 km, atmospheric tides, the use of indirect and direct methods for studies of the upper atmosphere etc.; measurements of the characteristics of the upper atmosphere by means of apparatus carried by rockets, including the construction of meteorological rockets and of the instruments employed (illustrated by means of photographs and diagrams), and the results of rocket investigations. Data are presented on the composition of the atmosphere at high altitudes, atmospheric pressure as measured on the instrument container, mean weighted values of temperature, pressure and density according to measurements with manometers and thermometers in a meteorological rocket, atmospheric pressure and temperature as measured in containers and rockets (including the meteorological rocket), and atmospheric pressure according to investigations made in the U.S.S.R. and the U. S. Various theoretical Soviet studies on ozone in the stratosphere, distribution of dissociated oxygen in the ozonosphere, vertical mixing in the upper atmosphere, the nature of the green flash, twilight luminescence etc., are summarized briefly. *Subject Headings: 1. Upper atmosphere research 2. U.S.S.R.—I.L.D.*

10.3-196

551.510.528

Staley, D. O., *A study of tropopause formation*. *Beiträge zur Physik der Atmosphäre*, Frankfurt a.M., 29(4):290-316, 1957. 16 figs., 25 refs., 32 eqs. German, English and French summaries p. 290. **DWB, DLC**—By following potential vorticity of individual air parcels, nonconservative frictional force and diabatic temperature change are found to occur during a specific case of tropopause formation. It is suggested that turbulent enthalpy flux is divergent for positive curvature of the temperature profile and thereby creates a tropopause by increasing curvature. Turbulent enthalpy flux is re-formulated for a curved temperature profile, and also by using "turbulon" theory for the inertial range to verify that the flux can be divergent for positive curvature of the temperature profile. *Subject Headings: 1. Tropopause formation 2. Turbulent enthalpy flux.—Author's abstract.*

10.3-197

551.510.528

Volkonskii, Iu. N., *O prichinakh izmeneniĭ polozheniia tropopauzy*. [Causes of fluctuations in the position of the tropopause.] *Meteorologiya i Gidrologiya*, Leningrad, No. 12:27-29, 1957. 6 refs., 9 eqs. **DWB, DLC**—The mechanical unification of the hypothesis of J. BJERKNES and of E. PALM into one advective dynamic theory of the oscillation of the tropopause does not explain the physical laws of the process since the fundamental assumptions regarding the reality of the tropopause have not been verified experimentally or substantiated theoretically. O. G. KRICHAK considers the variations in the height of the tropopause as a result of the transformation of the stratification curve at high altitudes caused by varying intensities of vertical movements and associated adiabatic cooling and warming in the upper troposphere and lower stratosphere. The adequacy of the conditions for the reality and adiabatic processes for these levels demonstrated on the basis of N. E. KOCHIN's hydrodynamic

theory of surfaces of weak discontinuity. The problem of the movement of the tropopause is formulated in the process of a surface of discontinuity of gradients of potential temperature. By means of equations it is shown that, on the assumption of adiabatic conditions, the rate of movement of the tropopause is equal to the normal component of wind velocity which is also a proof of the reality of the tropopause. It is demonstrated that the existence of adiabatic conditions can be deduced only from the assumption of the reality of the tropopause. If any of these schemes are valid then the variations in the height of the tropopause should be determined completely by vertical motion within its zone. Comparisons of the results obtained with adiabatic method and actual data on the height of the tropopause showed that the use of wind velocities in determining tropopause heights does not provide accurate results and that the adiabatic method is not entirely valid. *Subject Heading: 1. Tropopause height variations.—I.L.D.*

10.3-198

551.510.535

Gershman, B. N. and Ginzburg, V. L., **O mekhanizme vozniknoveniia ionosferykh neodnorodnostei**. [Mechanism of the formation of inhomogeneities in the ionosphere.] *Akademiia Nauk SSSR, Doklady*, 100(4):647-650, Feb. 1955. 14 refs., 4 eqs. **DLC**. Trans. into English by Morris D. Friedman, Inc., Needham Heights, Mass. Available for reference. **DWB** (M10.535 G381o)—The authors discuss a possible mechanism of formation of ionospheric inhomogeneities, namely the formation of convective instability in the ionosphere, similar to that which takes place in the sun where this mechanism leads to the appearance of granulation. The authors point out that the possibility merits attention inasmuch as other possibilities of formation of inhomogeneities are also, as yet hypothetical. *Subject Headings: 1. Ionospheric inhomogeneities 2. Convective instability in ionosphere.—A.M.P.*

10.3-199

551.510.535:525.6:523.3

Harnischmacher, E. and Rawer, K., **Mondgezeiten in Windmessungen der ionosphärischen E-Schicht**. [Lunar tide in ionospheric E layer wind measurements.] *Geofisica Pura e Applicata*, Milan, Vol. 39:216-224, Jan./April 1958. 7 figs., 6 refs. English, French and German summaries p. 216. **DLC**—Observations of the direction of the E region drift obtained in fall 1956 and 1957 are analyzed with respect to supposed 12 hr solar and lunar components. Both exist day and night, the amplitudes of both are of the same order of magnitude. *Subject Headings: 1. Lunar ionospheric tides 2. E layer winds.—Authors' abstract.*

10.3-200

551.510.535

Heisler, L. H. (*Electrical Eng. Dept., Univ. of Sydney*), **Anomalies in ionosonde records due to travelling ionospheric disturbances**. *Australian Journal of Physics*, Melbourne, 11(1): 79-90, March 1958. 6 figs., 3 tables, 6 refs. **DLC**—Anomalies, which frequently appear on ionosonde records of the F region during the passage of travelling disturbances, are classified into four main types; and the diurnal and seasonal distribution of their occurrence is discussed. It is suggested that the type of anomaly appearing on records depends on the ion density distribution at a height of about 200 km, which appears to be an upper bounding surface for the mode of travel of disturbances. A particular study has been made of winter disturbances. These are found to be so frequent that they affect all ionosonde records obtained during this season. They travel distances of at least 3000 km with fronts possibly broader than 1000 km. Attempted correlation with geomagnetic storminess was unsuccessful. Information is also presented on similar disturbances observed in North America. *Subject Headings: 1. Ionospheric anomalies 2. Ionosonde records 3. Ionospheric disturbances.—Author's abstract.*

10.3-201

551.510.535:551.594.12:621.396.8:523.8

Hewish, A. (*Cavendish Lab., Cambridge*), **The scintillation of radio stars**. (In: Beer, Arthur (ed.), *Vistas in astronomy*. London, Pergamon Press, 1955. Vol. 1:599-606. 2 tables, 19 refs.) **DLC** (QB3.B35)—The intensity and apparent position of radio sources are observed to fluctuate in a manner analogous to the scintillation of visual stars. Experiments are described which show that the scintillation is caused by diffraction of the incoming waves by irregularities of electron density in the upper ionosphere. The origin of the irregularities

is not known and the solution may raise problems of astronomical interest. A phenomenon similar to scintillation occurs when a radio source is viewed through the solar corona, and this fact enables deductions to be made about the irregular structure of the corona at distances in the range 5–15 solar radii. *Subject Headings: 1. Radio star scintillation 2. Ionospheric effects on stellar radio frequency rays.—Author's abstract.*

10.3-202

551.510.535:621.396.8:523.7

Kakinuma, Takakiyo, **Polarization of solar radio bursts at microwave frequencies**, Pt. 1. *Nagoya Univ. Research Institute of Atmospheric Sciences, Proceedings*, 5:71–80, March 1958. 6 figs., 2 tables, 6 refs. **DWB**—The intensity and polarization of solar radio bursts have been observed at 9400, 3750, 2000 and 1000 Mc/s since July, 1957. In this paper the results of observations during 6 months are described. In most bursts at microwave frequencies, the difference in the intensity of two circularly polarized components is observed. At 3750 Mc/s, the bursts of small degree of polarization (less than 10%) are predominant, compared with other frequencies. At 200 and 1000 Mc/s the circularly polarized bursts were occasionally observed, but not at 9400 and 3750 Mc/s and at 3750 Mc/s the linearly polarized components were not observed. In most bursts at four frequencies, the sense of polarization reverses near 3750 or 2000 Mc/s and the degree of polarization is generally small at 3750 Mc/s. At 9400 Mc/s, it seems that the sense of polarization correlates with the position of the source on the solar disk. Further observations will be continued to investigate the relation between them. *Subject Headings: 1. Solar radio noise 2. Polarization of radio waves.—Author's abstract.*

10.3-203

551.510.535:551.510.62:621.396.1

Nikol'skii, A. P., **K voprosu o geograficheskom raspredelenii v vysokikh shirotakh anomal'nogo pogloshcheniia radiovoln v ionosfere**. [Geographical distribution in high latitudes of radio blackouts in the ionosphere.] *Akademiia Nauk SSSR, Doklady*, 112(4):628–631, Feb. 1957. 2 figs., table, 6 refs. Trans. into English available Special Libraries Association, Trans. Center (John Crerar Library, Chicago) as its R-1179 (6 p.). **DLC**—Frequency, diurnal amplitude and phase of radio blackouts based upon analysis of foreign sources are discussed. The author uses the actual maximum instead of harmonic analysis. Evidence points towards a second maximum zone of blackouts near the poles in addition to the ring of maximum frequency in the zone of auroral activity. *Subject Headings: 1. Radio blackouts 2. Arctic 3. Ionospheric absorption.—A.A.*

10.3-204

551.510.535:551.557

Ogata, Yoshiharu (*Akita Radio Wave Obs., Radio Res. Labs.*), **Observation at Akita of ionospheric drift**. *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 10(2):91–92, 1956. fig. **DWB**—An observation was made to determine the velocity of ionospheric drift by a joint team of scientists from Akita Radio Wave Observatory and those from the Radio Research Laboratories. Transmitters were at Tazawa and Akita, both in Japan. Results show that the E layer nighttime observations yielded sufficient data of median value 50 m/s and a most frequent velocity of 40 m/s, whereas the F layer observation during the day gave a median of 120 m/s in each group and a most frequent velocity of 80 m/s. *Subject Headings: 1. Ionospheric drift 2. Akita, Japan.—N.N.*

10.3-205

551.510.535:551.594.13:551.507.362.1

Pfister, W. and Ulwick, J. C. (both, *A. F. Cambridge Research Center, Bedford, Mass.*), **The analysis of rocket experiments in terms of electron-density distributions**. *Journal of Geophysical Research*, Wash., D. C., 63(2):315–333, June 1958. 14 figs., table, 10 refs. **DLC**—Rocket ionosphere experiments give the relative delay of a pulsed signal as a function of rocket position. These data are used in an analysis to obtain the electron-density distribution with respect to height. This analysis, which takes into account the effects of the earth's magnetic field and the obliquity of the ray paths, is for the smooth, horizontally stratified ionosphere. The actual ionosphere, however, has an irregular or "blobby" structure evident in our delay records. The data then must be smoothed over a height interval corresponding roughly to the size of the blobs. The delay data from U.S.A.F. Aerobee No. 38, which was launched at 1210 hours MST on 26 June 1953, at Holloman Air Development Center, New Mexico are analyzed

for rocket ascent and descent for two frequencies, 4.05 and 4.87 Mc. The electron-density distribution from rocket descent data for both frequencies are in good agreement and show peaks at 106, 111, 117, and 128 km. For rocket ascent, an intense irregularity apparently was present around 98 km, with a minimum horizontal extension of 3.5 km and a maximum intensity of about 6×10^4 electrons/cm³. The P'-f record taken at launch time compares very well with the electron-density distribution from rocket descent. *Subject Headings: 1. Ionospheric electron density distribution 2. Rocket research.—Authors' abstract.*

ATMOSPHERIC EFFECTS ON RADIO PROPAGATION

See also: Ionosphere and forecasting telecommunication frequencies (de Maximy), 10.3-28; Radio blackouts in ionosphere (Nikol'skii), 10.3-203.

10.3-206

551.510.62:551.510.52

Anderson, L. J. (*Smyth Res. Associates, 3930 Fourth Ave., San Diego, Calif.*), **Tropospheric bending of radio waves.** *American Geophysical Union, Transactions*, 39(2):208-212, April 1958. 7 figs., table, 2 refs., 8 eqs. DWB, DLC—A simple and accurate method is presented for computing the refractive bending of radio waves in the lower 100,000 ft of the atmosphere. A given refractive-index profile is approximated by a series of straight lines (layers of constant gradient) and the incremental bending computed for each layer. The method is applied to the 'standard' atmosphere, and total bending is plotted against the surface refractive index for various vertical angles of arrival from 0 to 1 radian. *Subject Headings: 1. Tropospheric refraction 2. Refractive index profiles.—Author's abstract.*

10.3-207

551.510.62:621.396.1

Chambers, G. R.; Herbstreit, J. W. and Norton, K. A., **Preliminary report on propagation measurements from 92-1046 Mc at Cheyenne Mountain, Colorado.** *U. S. National Bureau of Standards, NBS Report*, No. 3520, Jan. 1, 1955. Supplement 4. 9 p. 17 refs., figs. DWB—A description is given of the facilities provided by the National Bureau of Standards on Cheyenne Mountain in Colo. and in its vicinity which are used for the measurement of the transmission loss on radio transmission circuits operated in the frequency range from 92 to 1046 Mc. Some preliminary results of these measurements are presented, together with tentative theoretical explanations. *Subject Headings: 1. Radio transmission loss 2. Cheyenne Mountain, Colo.—Authors' abstract.*

10.3-208

551.510.62:621.396.67

Rice, P. L. and Daniel, F. T., **Radio transmission loss versus distance and antenna height at 100 Mc.** *U. S. National Bureau of Standards, NBS Report*, No. 3520, Jan. 1, 1955. Supplement 8. 25 p. 11 figs., tables, 7 refs., 4 eqs. DWB—This report describes curves of transmission loss versus distance and antenna height derived from an analysis of approximately 159,000 hourly median field strength observations between 90 and 110 Mc. These observations extend over a period of several years and are distributed geographically over the whole U. S. The curves contained in this report are believed to be more precise for engineering use than the FCC Ad Hoc Committee curves published in 1949, the only curves of this character generally available up to now. *Subject Headings: 1. Radio transmission loss 2. Radio antenna heights.—Authors' abstract.*

10.3-209

551.510.62:621.396.67

Rice, P. L.; Daniel, F. T.; Mansfield, W. V. and Short, P. J., **Radio transmission loss versus angular distance and antenna height at 100 Mc.** *U. S. National Bureau of Standards, NBS Report*, No. 3520, Jan. 1, 1955. Supplement 9. 26 p. 11 figs., tables, 19 refs., 11 eqs. DWB—This report derives prediction curves of radio transmission loss and its long-term variability in time. The prediction parameters are angular distance and transmitting or receiving antenna height, with one antenna height fixed at 30 ft. The curves are based on observations of transmission loss over propagation paths in the area of the U. S. east of the Rocky Mountains, with data from the Pacific Coast shown for comparison. The basic data for the analysis reported here are hourly median values of transmission loss at frequencies

between 92 and 108 megacycles. *Subject Headings:* 1. Radio transmission loss 2. Radio antenna heights.—*Authors' abstract.*

10.3-210

551.510.62:551.590.25

Saxton, J. A. (*D.S.I.R., Slough, Gt. Brit.*), *La physique de la diffusion ionosphérique sur ondes métriques*. [Physics of ionospheric scattering of meter waves.] *L'Onde Électrique*, Paris, 37 (362):450-455, May 1957. 20 refs., 2 eqs. **DLC**—Possibilities of VHF communication (25-60 MHz) over distances of the order of 1000-2000 km by means of irregularities in the ionospheric E region have been established by recent research. The author reviews theoretical and experimental research work concerning the mode of propagation and concludes that the scatter signals may be due to either turbulence or meteors. While it is not possible, at present, to ascertain the prevalence of either of these factors, it appears probable that night signals are almost entirely due to meteoric scattering. *Subject Headings:* 1. Ionospheric radio wave propagation 2. Meteor influences on radio wave scattering 3. E region.—*G.T.*

10.3-211

551.510.62:621.396.8

Whitehead, J. D. (*Otago Univ., Dunedin, N. Z.*), *Distance attenuation of radio waves reflected at vertical incidence from the ionosphere*. *Journal of Atmospheric and Terrestrial Physics*, London, 12(2/3):150-152, 1958. table, 3 refs. **DLC**—It is shown that the assumption that the amplitude of radio waves, propagated from a point source, falls off inversely as the group path P' leads to a value of apparent reflection coefficient of the ionosphere which may be seriously in error, and in particular, to a large error in the measurement of the electronic collision frequency in the F region. *Subject Headings:* 1. Ionospheric attenuation 2. Electron collision frequencies.—*Author's abstract.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: Dynamic meteorology textbooks (Logvinov), 10.3-5; Wind computations at sea (Drogaitsev), 10.3-73; Numerical forecasting techniques (Bring, Charasch), 10.3-166; Numerical forecasting with barotropic models (Charasch), 10.3-168; Vorticity-typhoon track relationships (Fukaya), 10.3-172; Planetary atmospheres and convection in rotating fluids, 10.3-180; Atmospheric pollution dispersal (Cramer), 10.3-184; Heat and moisture transport (Shcherbakova, Bregina), 10.3-222; Thermal and radiation balance of earth (Staab), 10.3-252; Moisture exchange, European U.S.S.R. (Griгор'eva), 10.3-275; Turbulent exch. effects on cloud structure, U.S.S.R. (Kozharin), 10.3-293.

10.3-212

551.511.33:551.515.43:551.508.85

Das, P. M.; De, A. C. and Gangopadhyaya, M. (*all, Regional Met. Center, Calcutta*), *Movements of two nor'westers of West Bengal: a radar study*. *Indian Journal of Meteorology and Geophysics*, Delhi, 8(4):399-406, Oct. 1957. 14 figs., 4 refs. **DWB, DLC**—Nor'wester squalls occurring at Dum Dum airport were followed for 2 or 3 hrs by 3 cm radar on April 3 and 8, 1955 and PPI photographs reproduced along with upper wind charts for the region of India and Bengal from 15° to 30°N and 75° to 100°E. The horizontal structure of the squalls is clearly shown by the hooked echoes in both cases. Winds of 82 mph at 1745 on the 8th were the most violent of the season. No indication of the southerly movement of 33 kn of the squall line from 1605 to 1845 on the 8th is evident from the low or high level winds of that day. *Subject Headings:* 1. Northwesters in West Bengal 2. Thunderstorms 3. Radar thunderstorm detection 4. Dum Dum Airport, Calcutta, India.—*M.R.*

10.3-213

551.511.6:535.2:577.1:58

Inoue, E. (*Div. of Met., Natl. Inst. of Agricultural Sciences*), *Turbulent transfer phenomena over the waving plants (Studies of the phenomena of waving plants ("HONAMI") caused by wind, Pt. 4)*. *Journal of Agricultural Meteorology*, Tokyo, 12(4):138-144, March 1957. 2 figs., 2 tables, refs., 24 eqs. In Japanese; English summary p. 143. **DWB**—Surveying the existing theories on turbulent transfer above the earth's surface the author has pointed out that the following relations are considered most reasonable for the vertical distributions of wind velocity U , air temperature Θ , humidity E and CO_2 concentration C and also for the

turbulent fluxes of heat L , water vapor Q and CO_2P :

$$\frac{U}{V_*} = \frac{2.303}{k} \log \frac{z-d}{z_0} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z-d),$$

$$\frac{\Theta - \Theta_0}{\Theta} = \frac{2.303}{k} \log \frac{z-d}{z_0} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z-d),$$

$$\frac{E - E_0}{E_*} = \frac{2.303}{k} \log \frac{z-d}{z_0} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z-d),$$

and

$$\frac{C - C_0}{C_*} = \frac{2.303}{k} \log \frac{z-d}{z_0} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z-d);$$

$$L = \frac{\rho C_p (U_2 - U_1) (\Theta_1 - \Theta_2)}{\left\{ \frac{2.303}{k} \log \frac{z_2-d}{z_1-d} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z_2 - z_1) \right\}^2},$$

$$Q = \frac{(U_2 - U_1) (E_1 - E_2)}{\left\{ \frac{2.303}{k} \log \frac{z_2-d}{z_1-d} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z_2 - z_1) \right\}^2}$$

and

$$P = \frac{(U_2 - U_1) (C_1 - C_2)}{\left\{ \frac{2.303}{k} \log \frac{z_2-d}{z_1-d} - \alpha \frac{gL}{\rho C_p \Theta V_*^3} (z_2 - z_1) \right\}^2}.$$

The empirical constant α has been found to be within the range from 0.6 to 3. The friction velocity V_* , friction temperature Θ_* , friction humidity E_* and friction concentration C_* are respectively related to the turbulent fluctuations in corresponding elements. Making use of the above relation, the author presents an aerodynamical method of estimating the rate of photosyntheses of vegetations. Preliminary results of this method applied to a paddy field have been presented and it seems that these results are considerably promising and encouraging for its further application. (For Pts. 1-3, see 9.10-208-9.10-210, Oct. 1958, *MAB.*) *Subject Headings:* 1. Turbulent transfer 2. Photosynthesis of vegetation 3. Turbulence theory.—*Author's abstract.*

10.3-214

551.511.32:551.573

Tomitaka, S., **The amount of evaporation in the light of energy budget.** *Journal of Meteorological Research*, Tokyo, 10(3):198-204, March 1958. 6 figs., 5 tables, 4 refs., 13 eqs. In Japanese; English summary p. 198. **DWB, DLC.** Also, Ito, N., [**Comments on**] S. Tomitaka: **The amount of evaporation . . .** [**and**] **Reply by Tomitaka.** *Ibid.*, 10(6):536-537, June 1958. 2 refs. In Japanese. **DLC**—In order to estimate the amount of evaporation, the energy-balance method is employed. Energy consideration at the boundary between the air and the stagnant water leads to the following relation:

$$I - rI + I_B + K + E + c\rho\kappa^2 \frac{\partial T}{\partial z},$$

where I =incoming solar radiation, rI =reflected solar radiation, I_B =upward flux of (long wave) radiation, K =flux of sensible heat from the surface, E =heat consumed for evaporation, and $c\rho\kappa^2 \frac{\partial T}{\partial z}$ =downward flux of heat carried into the water and stored there. From this the following equation is obtained to estimate the amount of daily evaporation.

$$\epsilon = \sum_{i=1}^{n^0} \frac{I_i(1-r)_i - I_{B_i} - c\rho\kappa^2 \left(\frac{\partial T}{\partial z} \right)_i}{(1+q)_i L},$$

where ϵ =amount of evaporation (mm/day), L =latent heat of evaporation=590 cal/gr and the summation is taken for every hour. The amount of evaporation on fair days is calculated for each month in 1956. These values agree fairly well with the measurements by evaporation pan, considering the assumption employed here that the water temperature is constant and Bowen's ratio is roughly equal to 0.1. Several remarks are added for the method of observation with evaporation pan. *Subject Headings: 1. Evaporation estimation 2. Energy balance method of evaporation calculation.—Author's abstract.*

10.3-215

551.511.32:551.515.33

Matveev, L. T., *Pravila kachestvennogo analiza usloviĭ vikhreobrazovaniia v atmosfere i nekotorye rezul'taty proverki ikh.* [Rules for the qualitative analysis of the formation of vortices in the atmosphere, and results of their verification.] *Meteorologiya i Gidrologiya*, No. 4:28-31, April 1956. 3 tables, 5 refs. **DWB, DLC**—The equation of transport of vortices which permits qualitative conclusions regarding the origin and movement of cyclones and anticyclones is presented and is combined with the equations of atmospheric state. The relationship of changes in the vertical components of a vortex in a fixed region to geostrophic advection of cold or warm air, meridional movement of air masses, horizontal and vertical transport of vortices from other regions, divergence of horizontal wind velocity, nonuniform distribution of the field of vertical velocity and forces of turbulent friction are formulated as qualitative rules and tested against observational data and, on the whole, a satisfactory agreement is found between them. *Subject Headings: 1. Vortex movement 2. Vorticity transfer theories.—I.L.D.*

10.3-216

551.511.6:551.551.2

†Broïdo, A. G., *Nekotorye rezul'taty issledovaniia integral'nogo koeffitsienta turbulentnogo peremeshivaniia.* [Some results of an investigation of the integral coefficient of turbulent mixing.] *Meteorologiya i Gidrologiya*, Leningrad, No. 9:27-30, 1957. figs., 17 refs., 7 eqs. **DWB, DLC**—M. I. BUDYKO's formula for calculating vertical turbulent heat flow in the layer near the ground, $P = \rho c_p D_{0-z} (t_0 - t_z)$, (ρ and c_p =density and heat capacity of the atmosphere, D_{0-z} =integral coefficient characterizing intensity of turbulent mixing up to the layer z , t_0 =temperature at the ground and t_z =air temperature at z) has the advantage that for various values of D_{0-z} , turbulent mixing can be determined from standard station observations. In this paper the author presents the results of a study of the characteristics of the integral coefficient D_{0-z} for the first 200 m. The formula for calculating D_{0-200} is $D_{0-200} = \frac{53.7P}{t_0 - t_{200}}$ cm/sec, where

P is in cal/cm²/min and the equation for P is $P = \frac{(R-B)\Delta t}{\Delta t + 1.56\Delta e}$ cal/cm²/min, where R and B =radiational balance and heat flux in the soil (in cal/cm²/min) respectively and Δt and Δe difference of air temperature and vapor pressure in the boundaries of the atmospheric layer near the ground. With the aid of formula $\frac{t_0 - t_{200}}{t_0 - t_{200}} = -\alpha + \sqrt{\alpha^2 - \beta}$, where $\alpha = (2.13i_1^2 + 1.32 \cdot 10^{-7}i_1T_{200}^3)$ and $\beta = 19.4i_1(LE+B-R_0)$, where R_0 =monthly total of radiation balance of the ground surface, T_{200} =air temperature in absolute degrees, LE and B =monthly total of heat loss by evaporation and of heat flow in soil. Values of integral coefficient D_{0-200} are constructed for July for European U.S.S.R. and indices are shown on a map. *Subject Headings: 1. Turbulent mixing 2. Turbulent transfer of heat 3. Turbulence coefficient.—I.L.D.*

10.3-217

551.511.6

Dugstad, Ivar, *A generalization of Richardson's criterion of turbulence.* Texas. Agricultural and Mechanical College. Dept. of Oceanography, Contract AF 19(604)-559, Scientific Report, No. 11, Aug. 1956. 34 p. 5 figs., 9 refs., numerous eqs.—A review of REYNOLD's theory of turbulence in an incompressible fluid is given. Based on this theory, RICHARDSON's criterion of turbulence in the atmosphere is extended to include also horizontal wind shear and curvature of the mean flow. It is shown that the application of RICHARDSON's criterion to the atmosphere underestimates the number of instances of increasing turbulence. *Subject Headings: 1. Turbulence theories 2. Richardson's criterion.—Author's abstract.*

10.3-218

532.72:551.511.6:518.3:518.3

Greenfield, Harvey, **Theoretical derivations and nomographic methods for Sutton's diffusion equations.** *U. S. Dugway Proving Ground, Utah, DPGRR*, No. 107, Sept. 10, 1956. 84 p. 15 figs., 5 tables, 29 foot-refs., numerous eqs. DWB—This report is a survey of diffusion equation solutions and also includes hypotheses underlying their derivations and limitations to their applicability. SUTTON's diffusion equations will be treated since they are the most widely accepted equations available at this time. These solutions are derived from a Fickian equation which is similar to the well-known heat conduction equation. A thorough study has been made to introduce the diffusion forms to the Chemical Corps reader and to provide the necessary steps for future modifications. The theory of nomograms as applied to SUTTON's results has been treated extensively in order to show the power of its use, possible extensions of the resulting diagrams, and the necessary results for forming new nomograms for diffusion calculations. Included are six computed nomograms with examples. With these and sufficient practice in their use, concentration and dosage factors can be formed from known meteorological parameters in a matter of seconds. *Subject Headings: 1. Diffusion equations 2. Nomograms.—Author's abstract.*

10.3-219

551.511.6:551.515.13

Matveev, L. T., **Pravila kachestvennogo analiza uslovii vikhreobrazovaniia v atmosfere i nekotorye rezul'taty proverki ikh.** [Rules for the qualitative analysis of the formation of vortices in the atmosphere, and results of their verification.] *Meteorologiya i Gidrologiya*, No. 4:28-31, April 1956. 3 tables, 5 refs. DWB, DLC—The equation of transport of vortices which permits qualitative conclusions regarding the origin and movement of cyclones and anticyclones is presented and is combined with the equations of atmospheric state. The relationship of changes in the vertical components of a vortex in a fixed region, geostrophic advection of cold or warm air, meridional movement of air masses, horizontal and vertical transport of vortices from other regions, divergence of horizontal wind velocity, nonuniform distribution of the field of vertical velocity and forces of turbulent friction are presented as qualitative rules and tested against observational data, and, on a whole, a satisfactory agreement is found between them. *Subject Headings: 1. Vorticity analysis 2. Cyclogenesis 3. Anticyclogenesis.—I.L.D.*

10.3-220

551.511.6:551.551

Saltzman, Barry (M.I.T.), **Equations governing the energetics of the larger scales of atmospheric turbulence in the domain of wave number.** *Journal of Meteorology*, Boston, 14(6):513-523, Dec. 1957. 39 refs., 63 eqs. DWB, DLC—By considering the Fourier analysis of the planetary field of motion in the atmosphere, it is possible to define "scales" of motion and to write equations which govern the behavior of these separate scales of motion. Specifically, equations for the rate of change of the kinetic and available potential energy of a disturbance of a given wave number are presented. Such equations, which include the effects of the generation and release of potential energy, friction, and the transfer of energy among the various scales of eddies and the mean flow, can serve as a basis for studying the day-to-day variations of the spectral distribution of kinetic energy and for computing the "steady-state" atmospheric energy cycle in the domain of wave number, with the use of daily hemispheric data. *Subject Headings: 1. Kinetic energy 2. Atmospheric turbulence 3. Energy equations.—Author's abstract.*

GENERAL CIRCULATION

See also: **Circulation index changes** (Defant, Taba), 10.3-23; **Jet stream and jet aircraft operation** (Reiter), 10.3-80; **Numerical forecasting with barotropic models** (Charasch), 10.3-168; **Planetary atmospheres and convection in rotating fluids**, 10.3-180; **Atmospheric oscillations** (DeBoer), 10.3-256.

10.3-221

551.513:551.509.33 (52)

Ando, M., **The general circulation observed from the variations of the mass of air over the Northern Hemisphere, Pt. 3.** *Journal of Meteorological Research*, Tokyo, 9(12):870-877, Dec. 1957. 12 figs., 15 refs. In Japanese; English summary p. 870. DWB, DLC—It is

shown by means of synoptic analysis of the 5-day mean 500 mb charts that the strong and persistent surface high over high latitude area including the north pole is brought by the northward shift of upper middle latitude highs and the southward shift of the polar upper cold lows. The cool summer in Tohoku District is associated with the displacement of large warm highs into the north pole area and its neighborhood, which is classified into two types according to the period of its occurrence, viz., one occurs from middle to late spring before the "Bai-u" season and the other, from summer to early autumn. In the former case, the cool summer links with the seasonal appearance of quasi-stationary upper ridge near east Siberia in Bai-u season. (For Pts. 1 and 2, see 8.8-200, Aug. 1957 and 9G-69, July 1958, MAB.) *Subject Headings: 1. Atmospheric circulation anomalies 2. Synoptic conditions for cool summers 3. Bai-u 4. Japan.—Author's abstract.*

10.3-222

551.513:551.511

Shcherbakova, A. Ia. and Bregina, A. Iu., *Issledovanie perenosov tepla i vlagi v sviazi s obshchei tsirkulatsiei atmosfery*. [Investigation on the transport of heat and moisture in relation to general atmospheric circulation.] Leningrad. *Glavnaia Geofizicheskaja Observatoriia, Trudy*, 70:3-37, 1957. 9 figs., 11 tables, 7 refs., 5 eqs. **DLC**—The results of a detailed study made on the basis of surface 850, 700 and 500 mb charts and some primary aerological data of the Central Institute of Forecasting and the Institute of Aeroclimatology for 1951, 1953 and partly for 1948, showing the quantitative characteristics of the changes in moisture and heat over Eurasia. Values of the heat and moisture transfer, as well as the horizontal dispersion of air particles, are presented and discussed. *Subject Headings: 1. Heat and moisture transport 2. Moisture exchange over continents.—A.M.P.*

10.3-223

551.513

Stommel, Henry; Arons, A. B. and Faller, A. J. (*all, Woods Hole Oceanog. Inst., Mass.*), **Some examples of stationary planetary flow patterns in bounded basins**. *Tellus*, Stockholm, 10(2):179-187, May 1958. 10 figs. (incl. photos), table, 2 refs., 16 eqs. **DWB, DLC**—A simple regime of fluid flow is defined. This regime can occur in a homogeneous layer of fluid (1) of uniform depth on a rotating sphere and bounded by meridional barriers (2) of uniform depth of a betaplane and bounded by barriers running north-south (3) of radially non-uniform depth on a rotating plane and bounded by radial barriers. The essential elements defining the regime are: (a) the flow in the whole layer is steady and geostrophic except and only (b) at the western boundary where a narrow, intense western boundary current is permitted to depart markedly from geostrophy, and (c) the system, which would otherwise be at rest, is driven by a distribution of sources and sinks of fluid (this includes driving agents such as the wind, which can be expressed in terms of source and sink distributions). Predictions concerning patterns of flow have been deduced from the defined regime and verified experimentally on a rotating model of type (3). Certain results obtained were by no means intuitively obvious from a priori considerations. *Subject Heading: 1. Planetary flow patterns.—Authors' abstract.*

10.3-224

551.513.1

Castoldi, Luigi (*Istit. of Math., Univ. of Genoa*), **Una semplice dimostrazione del teorema di Bjerknes sulle circolazioni atmosferiche**. [A simple demonstration of the Bjerknes theory on atmospheric circulation.] *Geofisica Pura e Applicata*, 18:160-161, 1950. 9 eqs. **DLC**—The differential equations of motion are treated to give on a Eulerian hydrodynamic model the Bjerknes equations of atmospheric circulation. *Subject Headings: 1. Equations of motion 2. Bjerknes circulation theorem.—M.R.*

10.3-225

551.513.2:551.557.2

Maskovich, S. A., **O sezonnykh izmeneniiakh struinykh techenii**. [Seasonal variations in the jet stream.] *Meteorologiya i Gidrologiya*, Leningrad, No. 6:14-21, June 1956. 3 figs., 4 refs., 22 eqs. **DWB, DLC**—An attempt is made to establish theoretically the seasonal variation of the zonal circulation of the atmosphere. Formulas are derived for calculating the mean seasonal distribution and variation of zonal velocities and also the annual variation of zonal temperatures. These formulas are used to calculate the annual variation of the zonal circulation or jet stream at an elevation of 10 km for both high and low latitudes and the results

are shown on graphs. (See also 9.1-185, Jan. 1958, MAB.) *Subject Headings:* 1. Jet stream seasonal variations 2. Seasonal zonal circulation variations.—I.L.D.

10.3-226

551.513.2:551.557.5:551.515.1:551.515.7

Pogosian, Kh. P., *Futóáramlások mozgó légnyomási képződmények rendszerében*. [Jet streams within the system of moving pressure formations.] *Időjárás*, Budapest, 61(6):401-407, Nov./Dec. 1957. 8 figs. English summary p. 401. Russian text p. 467-471. **DLC**—The position of jet stream in cyclones and anticyclones, which forms in pressure fields with small gradients and passes through all stages of development, is investigated. The position of jet stream in relation to sea level pressure centers and fronts is found to be determined primarily by the variation of the temperature field due to advection and vertical currents. Jet streams develop and deform in a different manner over cyclones and over anticyclones. *Subject Headings:* 1. Jet stream-pressure relationships 2. Jet stream-cyclone relationships 3. Anticyclones.—*Trans. of author's abstract.*

10.3-227

551.513.3

Musaelian, Sh. A., *O tsentrakh deistviia atmosfery*. [Centers of action of the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 12:1520-1523, 1957. 1 ref., 18+eqs. **DLC**—After presenting the derivation of E. N. BLINOVA's theoretical equation (*Akad. Nauk SSSR, Dokl.*, 92(3): 1953; see 5.9-181, Sept. 1954, MAB) for determining the climatic fields of pressure at the earth's surface ("centers of action" of the atmosphere), the author attempts to generalize this theory for the case when the function of flow is taken as an exact expression obtained from the complete equation

$$\frac{1}{\bar{p}} \sin \theta \frac{\partial p'}{\partial \lambda} = -\alpha \frac{\partial^2 \phi'}{\partial \theta \partial \lambda} + 2(d+\omega) \operatorname{ctg} \theta \frac{\partial \phi'}{\partial \lambda}.$$

The derivation of a formula for determining the pressure at the earth's surface is prescribed, namely

$$p_0(\theta, \lambda) = \left[\frac{\partial \phi}{\partial \theta} \sin \theta + 2 \left(1 + \frac{\omega}{\alpha} \right) \cos \theta \cdot \phi \right] \tilde{P}_0.$$

Subject Heading: 1. Centers of action.—I.L.D.

ATMOSPHERIC DISTURBANCES

See also: Typhoon track forecasting, Japan (Nishimura), 10.3-8; Passage of lows over Antarctica (Van Loon), 10.3-53; Dakar-Abidjan air route (Renard, Casanova), 10.3-82; Rice paddy protection from typhoons (Kawamata et al.), 10.3-87; Recurvatures of tropical cyclones, Bay of Bengal (Chakravorty, Basu), 10.3-171; Vorticity-typhoon track relationships (Fukaya), 10.3-172; Maritime cyclones (George et al.), 10.3-173; Winds aloft-cyclogenesis relationships, Naze, Japan & East China Sea (Mori, Nomoto), 10.3-174; Vorticity transfer theory (Matveev), 10.3-215; Vorticity analysis (Matveev), 10.3-219; Jet stream-pressure relationships (Pogosian), 10.3-226; Sukhovei & air mass transport, Caspian Region, U.S.S.R. (Kuvshinova), 10.3-269.

10.3-228

551.515:551.557.5

Georgii, W., *Strahlströmung und Böenlinie*. [Jet streams and squall lines.] *Schweizer Aero-Revue*, Berne, 32(6):319-324, 1957. 12 figs. **DLC**—The author mentions two examples of jet streams, observed in Germany, in which are observed two distinct tropopause, namely polar (inferior) and tropical (superior). The outflow is not very turbulent in the axis of the jet, but very turbulent in the marginal zones. This strong turbulence cannot always be justified by the existence of a great wind gradient (shear), but, at a certain moment of the evolution, by the appearance of a thermically unstable layer, in which develops a thermoconvection circulation. This instability is bound to a warm air pressure and a modification of the tropopause. Föhn can enter in a phase of instability accompanied by the formation of thermoconvective streams, of which the vertical speeds are of the order of 10 m/sec. between 9 and 10 km altitude. The author draws attention to the fact that these observations are

important for air navigation, because of their relationships with the presence of squall lines.
Subject Headings: 1. Instability 2. Jet streams 3. Squall lines.—A. V.

10.3-229

551.515.1

Doneaud, A., *Scurt istoric asupra analizelor depresiunilor retrograde in Europa*. [Brief history of the analysis of retrograde cyclones in Europe.] *Meteorologia și Hidrologia*, Bucharest, 2(3):17-20, July/Sept. 1957. DWB—Reports and analyses of cyclones moving counter to the usual west-east direction are reviewed (VAN BEBER, BJERKNES, KHROMOV, SWOBODA, FONTAINE). The retrograde cyclones occurred during the last decades over Europe and North America. *Subject Headings:* 1. Retrograde cyclones 2. Europe 3. North America.—G. T.

10.3-230

551.515.13/73(52)

Sasaki, R. and Tokita, M., *On the formation, path and velocity of cyclone and anticyclone in the area long. 108°~160°E and lat. 0°~60°N*. *Journal of Meteorological Research*, Tokyo, 10(3):179-184, March 1958. 6 figs., 4 refs., 6 tables. In Japanese; English summary p. 179. DWB, DLC—The paper on the distribution of formation, path and moving velocity of cyclone and anticyclone for the period from 1932 to 1956. The principal terms are: a) Cyclogenesis area and the most frequent area of cyclone path over and near Japan; b) Anticyclogenesis area and the most frequent area of anticyclone path; c) The velocity of cyclone tends to decrease towards the south, while that of anticyclone has no such tendency and has uniform distribution irrespective of latitude. *Subject Headings:* 1. Cyclone formation 2. Anticyclogenesis 3. Cyclone tracks 4. Japan.—Authors' abstract.

10.3-231

551.515.11:551.515.81

Lebedeva, N. V., *Vertikal'nye dvizheniia na fronte*. [Vertical movements near a front.] *Leningrad. Tsentral'nyi Institut Prognozov, Trudy*, 45(72):74-87, 1956. 4 refs., 5 figs., 4 tables. DLC—A method for calculating vertical displacement in a frontal zone is given. It is based upon the equations of A. F. DIUBIUK and P. P. LOGADKIN for the vertical velocity resulting from friction in the vicinity of fronts and for the vertical velocity in a front in the atmospheric layer at the earth's surface. The procedure of computation is carried out on surface pressure and pressure topography charts with the aid of tables which give for two frontal structures ($h=200-500$ m and $h \geq 1000$ m), the vertical velocity and pressure changes in the 1000-850 mb layer, in the 850 mb surface and in the 900-800 mb layer (on the 850 mb surface). Also the calculations of condensed moisture is illustrated. The results of computations are presented in tables and graphs. *Subject Headings:* 1. Vertical motion at fronts 2. Frontal zone.—I. L. D.

10.3-232

551.515.13:551.515.73

Mertsalov, A. N., *K voprosu o peremeshchenii baricheskikh obrazovaniĭ u poverkhnosti zemli*. [The question of the movement of pressure formations at the earth's surface.] *Meteorologiya i Gidrologiya*, No. 10:14-20, Oct. 1956. 2 figs., 2 refs., 3 eqs. DWB, DLC—The more immediate (than vortical transport) causes of the movement of pressure formations at the earth's surface are analyzed without considering any theory of pressure change. The formulas for analyzing the movement of pressure formations at the earth's surface are:

$$c(H_{1000})_{mm} = a \frac{\partial}{\partial m} \frac{\partial \tilde{T}}{\partial t} - \frac{\partial}{\partial m} \frac{\partial H_{700}}{\partial t}$$

and

$$\bar{u}(H_{1000})_{nn} = a \frac{\partial}{\partial n} \frac{\partial \tilde{T}}{\partial t} - \frac{\partial H_n}{\partial t} - \bar{v}(H_{1000})_{ns}$$

t —time, H_{700} —absolute geopotential of the isobaric 700 mb surface, H_{1000} —absolute geopotential of the absolute 1000 mb surface, s and n —the oblique and normal direction to the isohypse H_{700} passing over the surface baric center, m —direction of movement of the baric center at the earth's surface, c —velocity of its movement, u and v —components of velocity of the moving baric center at the earth's axis along the X and Y axes, $\bar{u}$ and $\bar{v}$ —components of movement of the velocity of the baric surface along the normal and oblique to the isohypse AT_{700} , $T=1/a(H_{700}-H_{1000})$ mean temperature of the layer of the bounding surfaces 700 mb—

100 mb. The role of nonuniform variations of atmospheric temperature with time and diminution of pressure gradient in the motion of pressure surfaces at the earth's surface is discussed. A specific example of the movement of a cyclone at the earth's surface in western European U.S.S.R. from 0900 to 1000 a.m. in April 1956 is analyzed. *Subject Headings: 1. Cyclone movement 2. Anticyclone movement 3. Synoptic studies.—I.L.D.*

10.3-233

551.515.2

Matano, H., *On the synoptic structure of Hurricane Hazel, 1954, over the Eastern United States.* *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 36(1):23-31, Feb. 1958. 13 figs., 4 tables, 7 refs., 3 eqs. **DWB, DLC**—The synoptic structure of Hurricane "Hazel," 1954, over the eastern U. S., is examined from the view point of NAMEKAWA-AOKI's theory and of NAMEKAWA-SEKIOKA's hypothesis. The result shows that "Hazel" has the same structure as that of typhoon hitting the Japanese Islands, i.e., "Hazel" is also composed of main and secondary typhoons, and she later forms a complex system with an extratropical cyclone formed on the pre-existing front. *Subject Headings: 1. Hurricane structure 2. Hurricane theory 3. Hurricane "Hazel" (1954).—Author's abstract.*

10.3-234

551.515.2

Palmén, E., *Vertical circulation and release of kinetic energy during the development of Hurricane Hazel into an extratropical storm.* *Tellus*, Stockholm, 10(1):1-23, Feb. 1958. 33 figs., 4 tables, 19 refs., 23 eqs. **DWB, DLC**—The thermal structure of the atmosphere over the eastern and central parts of the U. S. on Oct. 15, 1954, when the tropical hurricane "Hazel" entered the American continent and rapidly was transformed into an extratropical cyclone of great intensity, is analyzed by the aid of upper air charts and vertical cross sections. The field of divergence and vertical velocity is determined from the horizontal wind field at different levels for the synoptic time Oct. 15, 1500 GCT, and the results are used for computing the precipitation in the region of strongest ascent of the warm and moist air of the tropical disturbance and for a determination of the release of kinetic energy in the whole region due to vertical solenoidal circulations associated with the general sinking of the cold polar air masses and the simultaneous ascent of the warm tropical air masses. The production of kinetic energy is also computed directly from the work done by the horizontal pressure forces in the same area. Both methods give a production of kinetic energy of about 19×10^{10} kilojoules or 19×10^{20} ergs per second over an area 366×10^4 km² large. Only a small part of the energy released is again dissipated due to friction in the same area, whereas the essential part is exported outwards from the source region, thus furnishing the surrounding atmosphere with large amounts of kinetic energy. In the last section some general conclusions are made concerning the budget of kinetic energy in the whole Northern Hemisphere, considering the net effect of the disturbances in the westerlies, the mean meridional circulations, the mean meridional flux of kinetic energy and the frictional dissipation. *Subject Headings: 1. Hurricane transformation into extratropical cyclones 2. Vertical velocities in cyclones 3. Hurricane "Hazel" (1954).—Author's abstract.*

10.3-235

551.515.2(265)

Sasaki, R., *Coefficient of area, and frequency distribution of typhoon formation and path.* *Journal of Meteorological Research*, Tokyo, 10(2):96-98, Feb. 1958. 2 figs., table, refs. In Japanese; English summary p. 96. **DWB, DLC**—Most weather charts in current use are conformal ones, so they are not pertinent for the meteorological analysis concerning the area of the earth. The author calculated the ratio of the area of actual earth in a given latitude to that in a specified latitude, which is termed here the coefficient of area. Using the coefficient of area thus calculated, the frequency of typhoon formation and path in 10° square area for the past 10 yrs is obtained and shown in figs. *Subject Headings: 1. Typhoon formation 2. Typhoon statistics 3. Typhoon tracks 4. Pacific Area.—Author's abstract.*

10.3-236

551.515.71:551.524.4

Petrenchuk, O. P., *Nekotorye osobennosti vertikal'nogo stroeniia antitsiklonov.* [Some characteristics of the vertical structure of anticyclones.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, 72:19-32, 1957. 8 figs., table, 6 refs., 4 eqs. **DLC**—Results of a study of the problem of formation and distribution of inversions and steady layers in anticyclones

made on the basis of detailed analyses of growing, stationary, and abating anticyclones that took place over Soviet territory in recent years. It is shown that: 1) causes of temperature-inversion formation in anticyclones cannot be judged only by changes of relative humidity with height, obtained by radio sounding; 2) descending movements also cannot lead to the formation of inversions; 3) the structure of steady layers in winter and summer anticyclones differs considerably in regard to the magnitude of vertical-temperature gradients, to the situation of the lower limit of the steady layer, and to its vertical thickness; 4) there is a rather close correlation between the lower limit of steady layer and the height of the boundary layer (the correlation coefficient is equal to .85), etc. *Subject Headings: 1. Anticyclone structure 2. Inversion layers in anticyclones.—A.M.P.*

10.3-237

551.515.8:551.509.318

Galloway, James L. (*Canadian Met. Service*), **Three-front model: its philosophy, nature, construction and use.** *Weather*, London, 13(1):3-10, Jan. 1958. figs., 2 tables, 8 refs. **DWB**—The three-front model differs from the conventional Bjerknes model in respect to the separation between air masses—in the former the masses are separated by a hyperbaroclinic zone of transition; in the latter by a simple surface. The vertical wind shear as determined from a hodograph will indicate the horizontal temp.-gradient as well or better than a tephigram but shallow warm fronts are more clearly defined on a tephigram. Methods used in constructing the three-front model are outlined. Passage of "trowals," or upper fronts that move with the flow aloft, is noted on the surface map by inverted check marks. Advantages of use of three-front model are outlined. Tropopause and jet stream relationships can be incorporated, and a quantity of aerological data that was not available when the Bjerknes model was developed can be taken into account. The model is used in the Canadian Service in synoptic analysis. *Subject Headings: 1. Three-front models 2. Trowals 3. Canada.—M.R.*

10.3-238

551.515.8

Gubin, V. I., **Ob izmenenii nekotorykh meteorologicheskikh elementov vnutri frontal'nykh zon.** [Changes of certain meteorological elements within a frontal zone.] *Akademiia Nauk Uzbekskoi SSR, Izvestiia, Ser. Fiziko-Matematicheskikh Nauk*, No. 1:53-73, 1957. 10 refs., 106 eqs. Resume in Uzbek, p. 73. **DLC**—A theoretical paper in which the author analyzes the application of certain consequences of H. K. ERTEL's theorem to the problem of density, temperature change and vertical currents in frontal zones, as the density of the field and its changes are the greatest there. In Pt. 2 of the paper, dealing with geostrophic approximation, the author examines separately the variations of the geopotential height of the isobaric surface and the determination of vertical currents and temperature degrees. In Pt. 3—calculation of geostrophic corrections—he discusses the change of the geopotential height of the isobaric surface and the vertical currents, as well as the determination of temperature changes. *Subject Heading: 1. Frontal zone variations.—A.M.P.*

RADIATION AND TEMPERATURE

RADIATION

See also: Cosmic ray physics, 10.3-1; Light scattering function tables (Boll et al.), 10.3-26; Insolation calculations (Averkiev), 10.3-122; Diurnal pressure variations (Oeckel), 10.3-255; Visibility-radiation relationships, Blue Hill Obs. (Cunniff), 10.3-324.

10.3-239

551.501:551.521

Pisarchik, L. I., **Metod i rezul'taty issledovaniia radiatsionnogo balansa i ego sostavnykh chastei v raione Minska.** [Method and results of investigations on the radiation balance and its components in the Minsk region.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, 72:139-151, 1957. 13 figs., 2 tables, 33 refs., 7 eqs. **DLC**—A paper in which the author, besides describing the methods and results of an investigation on radiation balance and its components carried out at the Minsk Geophysical Observatory in 1948-1951 with the aid of a Michelson actinometer and a Ianishevskii pyranometer, discusses the principles of the

method applied, the sources of errors occurring in measurements in general, and evaluates the magnitude of errors obtained in his work. *Subject Headings: 1. Radiation balance calculations 2. Radiation measurement techniques 3. Minsk, U.S.S.R.—A.M.P.*

10.3-240

551.521.1:551.552:551.591(434.2)

*Band, Günther, *Ein Beitrag zur Globalstrahlung*. [Contribution to global radiation.] *Geofisica Pura e Applicata*, Rome, 37:231-236, 1957. 4 figs., table, 3 refs. German and English summaries p. 231. **DLC**—Two years of global radiation data for Cologne (Feb. 1955-March 1957) made with a Robitzsch bi-metallic pyranometer, are correlated with wind direction and visibility. The global radiation with westerly winds is 10% lower than with easterly winds on account of industrial air pollution from the west. The relation between global radiation and visibility is analyzed for different solar elevations (20°, 30°, 40°, 50° and 60°) during different months (Feb.-Oct.). At high solar altitudes the radiation increases rapidly with increasing visibility. At low altitudes of the sun it increases rapidly up to 5 km visibility and then levels off and is much less than for higher sun heights. *Subject Headings: 1. Global radiation-wind-visibility relationships 2. Cologne, Germany.—M.R.*

10.3-241

551.521.11:551.576.2(438)

*Michalczewski, Jerzy, *Uśłonecznienie i zachmurzenie Zakopanego*. [Cloud amount and duration of sunshine at Zakopane.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(3/4):227-233, 1955. 6 figs., 2 tables, 5 refs. English summary p. 233. **DWB, DLC**—The peculiarity of the location of Zakopane in a triangular hollow is reflected not only by the thermal conditions, but also by its cloudiness and insolation. The author tries to explain, on the basis of sunshine and cloud amount data for 1924-1948, the characteristic phenomena and their alteration produced by air circulation and other dynamic forces. The study shows that the variability of sunshine duration from month to month and year to year is considerable. Tables and several graphs show the mean, maximum and minimum hours per year of sunshine and overcast, the number of clear and cloudy days, the yearly variation of insolation, etc. On the basis of a short series of observations taken in two different locations at Zakopane, the author discusses the respective direction of sunshine in different parts of the town and indicates the right direction in which the city should develop. *Subject Headings: 1. Sunshine duration 2. Cloudiness 3. Zakopane, Poland.—A.M.P.*

10.3-242

551.521.11:551.501.4

Slocum, Giles (U. S. W. B.), *Total extraterrestrial solar radiation received per day on a horizontal surface by the earth*. [1952.] 29 p. 13 refs. Carbon of typescript. **DWB** (M21.31 U587to)—This paper presents, in greater detail than has hitherto been available in published form, a tabulation of the amount of extraterrestrial solar radiation received per day by the earth on a unit of horizontal surface. There are two types of tables. First, local or station tables, showing the total extraterrestrial solar radiation for each day of the year for each of a hundred observing stations. Second, general tables showing values at closely spaced intervals of latitude and of time of year. These tables may be used to determine radiation at points other than those for which local tables are given. Both Northern and Southern Hemispheres are covered in these general tables and the data contained in them are, in addition, presented in chart form. Directions are given for the use of the tables and charts, and examples are presented to facilitate application of these instructions. The historical background of solar radiation tables of this kind is briefly outlined, and a reference list of some of the previous writings on the subject is included. *Subject Heading: 1. Insolation tables.—Author's abstract.*

10.3-243

551.521.16:535.34:551.463

*Mackiewicz, Maria (Zesół Katedr Geofizyki U.W.), *Pomiary przenikania promieniowania w jeziorach Wielkopolskich w 1954 roku*. [Transmission of the solar radiation in the lakes of greater Poland.] *Przegląd Geofizyczny*, Warsaw, 1(3/4):183-189, 1956. fig., 4 tables, 2 refs., 3 eqs. English summary p. 189. **DWB, DLC**—On the basis of 28 measurements made in three lakes in greater Poland (Aug.-Sept. 1954), data on average transmission of vertically incident light are tabulated for various depths. These measurements supplement those made

by E. STENZ in 25 lakes (1935-1936 and 1950-1953) in other regions of Poland. *Subject Heading: 1. Light transmission by lake water 2. Poland.—G.T.*

10.3-244

551.521.18

*Gergen, John L. (*Univ. of Minnesota*), **Atmospheric infrared radiation over Minneapolis to 30 millibars.** *Journal of Meteorology*, Boston, 14(6):495-504, Dec. 1957. 15 figs., 2 tables, 22 refs., 15 eqs. **DWB, DLC**—This paper presents some of the conclusions from the results of about 300 Black Ball flights over Minnesota in 1955 and 1956 in which the total atmospheric infrared radiation is measured in terms of an equivalent radiation temperature. The data presented include typical measurements and a seasonal analysis of the radiation at various pressures. The measurements indicate that the net loss of energy to space by infrared radiation is considerably less than calculations have indicated and cast doubt on some of the assumptions implicit in those calculations. *Subject Headings: 1. Infrared radiation measurements 2. Minneapolis, Minn.—Author's abstract.*

10.3-245

551.521.18:551.575

Saitô, Takayuki (*Geophys. Inst., Tôhoku Univ.*), **Measurement of transmissivity of infrared radiation through fog.** *Tôhoku Univ. Science Reports, 5th Series, Geophysics*, 8(1):52-57, Nov. 1956. 3 figs., 3 refs., 12 eqs. **DWB, DLC**—The transmissivity of the infrared radiation through fog was measured for fogs of different size distribution. The result was compared with the computed transmissivity based on the Mie theory and a fairly good agreement was seen. *Subject Headings: 1. Infrared transmission through fog 2. Mie theory.—Author's abstract.*

10.3-246

551.521.18:551.591:551.571

Yamamoto, Giichi and Sasamori, Takashi, **Numerical study of water vapour transmission.** *Tôhoku Univ. Science Reports, 5th Ser., Geophysics*, 8(2):146-155, Feb. 1957. 7 figs., 3 tables, 10 refs., 11 eqs. **DWB, DLC**—The most accurate representation of the transmission for an infrared spectral interval is, of course, obtained by a numerical computation like COWLING's with respect to a real band. In this paper it is shown numerically that such a computed transmission is expressed as a function of the variable

$$u\sigma\alpha\delta^{-1} \left(\alpha^2 + \frac{u\sigma\alpha}{\pi} \right)^{-\frac{1}{2}},$$

which was introduced by GOODY in expressing the transmission of a model spectrum, where u is the absorbing mass in g cm^{-2} , α the half-width, σ the mean line intensity, δ the mean line distance. So that we only need to compute the transmission against u for a given value of the half-width. *Subject Headings: 1. Transmission of light through water vapor 2. Infrared transmission calculations.—Authors' abstract.*

10.3-247

551.521.2:551.524.3

Malkevich, M. S., **Vykhlozhivania atmosfery pod vlianiem luchistogo teploobmena.** [Cooling of the atmosphere under the influence of radiative heat exchange.] *Akademiia Nauk SSSR. Geofizicheskii Institut, Trudy*, No. 37(164):89-101, 1956. 6 figs., 2 tables, 8 refs., 17 eqs. **DLC**—An analysis of the influence of radiational heat exchange upon the temporal variation of atmospheric temperature at different altitudes. The selective absorption of long wave radiation by water vapor is taken into account. There is demonstrated the existence of a layer of atmospheric cooling and a layer of atmospheric heating due to long wave radiation, and also the existence of such a distribution of temperature about which small temperature changes are associated with repeated long wave radiation. Equations describing the temporal variation of the initial temperature distribution of the atmosphere and the actual computation of a given initial temperature distribution are presented. Graphs show the cooling over 24 hrs of a gray isothermal atmosphere with different coefficients of absorption, the 24 hr cooling of an isothermally selective atmosphere with different combinations of coefficients of absorption and variation of initial distributions of atmosphere temperature over 12 hrs. *Subject Headings: 1. Radiation heat exchange 2. Temperature variations 3. Radiational cooling 4. Temperature distribution.—I.L.D.*

10.3-248

551.521.326

Granderye, L. M., **Cómo medir fotográficamente la luminosidad del cielo nocturno.** [How to measure photographically the luminosity of the night sky.] *Urania*, Barcelona, 41 (243):73-76, April/June 1956. fig. DWB, DLC—Night airglow observations by photometry are briefly discussed and a device for measuring vertical, horizontal and intermediate luminosity with equal accuracy is described and illustrated. *Subject Heading: 1. Night airglow photometry.*—M.R.

10.3-249

551.521.4:551.521.18:535.33

†Norden-Ketay Corporation, White Plains, N. Y., **Correlation of data concerning visible and near infrared radiation from the night sky.** Contract AF 18(600)-1746, Final Report 152 R 0001, Aug. 20, 1957. 58 p. 22 figs., 23 refs. DWB (M21.4 N829co)—The astronomers and astrophysicists were the first to discover that the night sky was not completely dark. Realization of this fact stimulated a great deal of interest which resulted in many measurement programs designed to determine the spectral emission and intensity characteristics of the night sky. During the course of the programs, it became quite obvious that the night sky radiated measurable quantities of energy in the ultraviolet, visible, and near infrared region, the recognized trend being an increase in intensity with increased wave length. The radiation consists of line and band emissions superimposed on a strong continuum in the blue and a weak continuum in the red and infrared. The bulk of the energy is concentrated in the region bounded approximately by .7 and 1.5 microns and appears to be moderately constant throughout the course of a night. Investigators have succeeded in determining the intensities, spectral distribution, source of the energy and the variation of intensities with latitude and zenith angle. It is to be noted that most of the data, excluding absolute intensities and spectral distribution, needs to be corroborated by more numerous and conclusive investigations before being accepted with any great degree of confidence. *Subject Headings: 1. Infrared spectrum of night airglow 2. Night airglow spectra.*—*Author's abstract.*

TEMPERATURE

See also: Temp. at N. Atlantic weather stations (Rosenthal, Gleeson), 10.3-18; *Ice field effects on air temp.* (Wexler), 10.3-54; *Current effects on air temp.* (Byzova), 10.3-72; *Temp. effects on maize* (Shigolev), 10.3-86; *Petroleum industry and degree-day forecasts* (Sweeney), 10.3-93; *Temp. effects on gas diffusion, Dugway Proving Grounds, Utah* (Tank), 10.3-191; *Anticyclone structure* (Petrenchuk), 10.3-236; *Radiation heat exchange and cooling* (Malkevich), 10.3-247; *Orographic disturbances* (Klieforth), 10.3-273; *Eclipse effects on temp. variations, Azov Sea Coast* (Dmitriev et al.), 10.3-321.

10.3-250

551.524.4:551.311.184(98)

*Belmont, A. D. (McGill Univ.), **Lower tropospheric inversions at Ice Island T-3.** In: Polar Atmosphere Symposium, Oslo, July 2-8, 1956, *Proceedings, Pt. 1, Meteorology Section*. N. Y., Pergamon Press, 1958. p. 215-284. 6 figs., 66 tables. Also issued in *Journal of Atmospheric and Terrestrial Physics, London, Special Supplement, Pt. 1, 1957, pub. 1958*. p. 215-284. DLC—The complete record of the first two years of radiosonde observations from the Polar Basin have been analyzed with respect to thermal inversions. An objective classification system was introduced to permit exact determinations of type, magnitudes of component layers and frequencies of occurrence, of inversions. The method has general applicability to other portions of the radiosonde ascent. A new unit of inversion intensity was introduced and appears to be an improvement over the use of lapse rate. Some new relationships of inversion characteristics are presented, and a general qualitative theory is suggested to explain the differences found with previous theory. (For abstract from another source, see 10.3-248, July 1957, MAB.). *Subject Headings: 1. Low level inversions 2. Arctic Ice Island T-3 3. Arctic inversions 4. Arctic Ocean.*—*Author's abstract.*

10.3-251

551.524.4:551.571.4:551.593.1

Elnesr, M. K., **Variation verticale de l'indice de réfraction de l'air.** [Variation of the atmospheric refractive index with height.] *Journal Scientifique de la Météorologie*, Paris,

7(27):289-293, July/Sept. 1955. fig., 3 tables, 5 refs., 8 eqs. English and Spanish summaries p. 289. **DWB**—Simultaneous measurements of humidity and temperature gradients have been used in the study of the variation of refractive index with height. The profiles obtained for the 2 m above the ground have shown that the variation of refractive index with height is logarithmic for the different atmospheric layers. *Subject Headings: 1. Temperature profiles 2. Humidity profiles 3. Refractive index.*—*Author's abstract.*

10.3-252

551.524.4:551.511.1

Staab, Wilhelm, *Beiträge zum Problem der Wärmestrahlung und des Wärmeaustauschs in Bodennähe*. [Contributions to the problem of heat radiation and heat exchange near the ground.] Mainz, 1954. 41 p. eqs. Thesis (Ph.D.), University of Mainz. Biog. note, p. (43). **DLC** (QC901.S75)—A purely theoretical dissertation on the relation between long wave radiation and the thermal balance or Austausch of the ground, on the stationary condition, on the periodical processes and on aperiodic processes dependent on temperature distribution. *Subject Headings: 1. Thermal balance of earth 2. Radiation balance of earth.*—*M.R.*

10.3-253

551.524.4

†Webb, E. K. (*Div. of Met. Physics, Commonwealth Sci. & Ind. Res. Org., Melbourne*), **Vanishing potential temperature gradients in strong convection**. *Royal Meteorological Society, Quarterly Journal*, 84(360):118-125, April 1958. 4 figs., table, 20 refs. **DWB, DLC**—Temperature profiles recorded up to 30 m show an unexpected feature in conditions of free convection with light wind. Above the strong lapse near the ground, there is a transition to zero potential temperature gradient. The height of the transition level falls as the wind strength decreases, becoming less than 8 m when the negative Richardson number at 1.5 m is greater than 0.4. From reported observations over the sea it seems that the feature is present there also. *Subject Headings: 1. Potential temperature gradient 2. Strong wind effects on temperature gradients.*—*Author's abstract.*

UPPER AIR TEMPERATURES

See: Cloud structure-temp. and humidity (Cunningham), 10.3-131; *Radiation error of French radiosondes* (Petit), 10.3-148.

SOIL TEMPERATURE

See: Water permeability of frozen soil (Komarov), 10.3-306.

WATER TEMPERATURE

See: Ocean temp. effects on European synoptic processes, North Atlantic (Pagava et al.), 10.3-15; *Thermal regime of Arctic lakes* (Brewer), 10.3-52; *Current effects on air temp.* (Byzova), 10.3-72.

PRESSURE AND WIND

PRESSURE

See also: Mean monthly absolute and relative topography over N. Hemisphere (Jacobs), 10.3-14; *Numerical pressure field forecasting* (Chaplygina), 10.3-167; *Wind-isobar angle* (Weiller), 10.3-262; *Eclipse effects on pressure variations, Azov Sea Coast* (Dmitriev), 10.3-321.

10.3-254

551.543:525.6

Mariani, F., *Sulla teoria delle maree atmosferiche gravitazionali*. [Theory of gravitational tides in the atmosphere.] *Annali di Geofisica*, Rome, 10(3/4):211-220, July/Oct. 1957. 2 figs., 8 refs., 40 eqs. Italian and English summaries p. 219-220. **DLC**—In this paper we

consider the theory of gravitational tides in the atmosphere, assuming the exact height dependence of the radius vector $R+z$ and of the gravity acceleration $g(z) = G \frac{R^2}{(R+z)^2}$ (z is the height on the ground, R is the earth's radius and G is the ground value of g). We consider also the terms of first order in $1/R$. The fundamental equation, whose solution is responsible for the height variation of the velocity components, u , v , w and of the pressure oscillation p , is modified, with respect to the "classical" theory, by the presence of a term which appreciably affects the analytical form of the solution itself; also the analytical form of the above variables is thus appreciably modified. We apply the theory to an atmosphere having a constant scale height H and show some interesting numerical results. Further generalization to the general case of thermal and gravitational oscillations is now in progress. *Subject Heading: 1. Atmospheric tides.*—*Author's abstract.*

10.3-255

551.543.1:551.521.1(435.8)

Oeckel, H., *Beziehungen zwischen Einstrahlung und täglichem Gang des Luftdrucks in Frankfurt am Main*. [Relation between insolation and daily pressure variations at Frankfurt a.M.] *Frankfurt a.M. Universität. Meteorologisch-Geophysikalisches Institut, Bericht*, No. 6:59-65, 1956. 2 figs., 2 tables, 12 refs. DWB—R. MÜGGE's theory that the daily temperature variation between the lower troposphere above the bottom layer and the upper outgoing radiation zone determines fundamentally the diurnal double pressure wave is examined. For a period of three years the author measured diurnal pressure variations and computed incoming radiation from effective sunshine duration with the aid of Ångström's formula. A correlation of ± 0.754 was established between diurnal pressure drop and incoming solar radiation. Also in localities like Frankfurt a.M. the drop in pressure can be considerable without weather changes due to anticyclonic situations. *Subject Headings: 1. Diurnal pressure variations 2. Solar radiation 3. Ångström's formula 4. Frankfurt a.M., Germany.*—*I.L.D.*

10.3-256

551.543.3:551.513

De Boer, H. J. (*Royal Netherlands Met. Inst., De Bilt*), *On the ratio noise-signal of long-periodic oscillations in the general atmospheric circulation*. *Geofisica Pura e Applicata*, Rome, 37:309-317, 1957. 2 tables, 4 refs., 15 eqs. DLC—Characteristic features of long-periodic oscillations in general atmospheric circulation may be deduced from the correlation existing between monthly, three-monthly, six-monthly and twelve-monthly figures of the barometric pressure at two distant stations and from the autocorrelation of the same figures at each station. It is shown that the monthly figures of barometric pressure at Easter Island and those at Djakarta during the six years 1950-1955 have, when plotted as a function of time, one oscillation in common, whereas these figures also have their own rhythms and their own noise. The period of the common oscillation is 28.6 months, while the phase difference between both stations amounts to 180° . The r.m.s. value of the noise is 0.76 times the value of the amplitude of the oscillation. The rhythms differ in wave length, amplitude and phase. It is also shown that the monthly figures of the barometric pressure at Ponta Delgada and those at Stykkisholm have, when plotted as a function of time, a whole spectrum of oscillations jointly, while all oscillations have the same phase difference (238°) between both stations. These features are deduced from observations during 40 yrs (1896-1915 and 1921-1940). If yearly figures are used instead of monthly ones, then the greater part of the spectrum of oscillations is smoothed away and only a few common oscillations are left. The first common oscillation has a wave length of 26.5 months and the second one has a wave length of 38.7 months. *Subject Headings: 1. Atmospheric oscillations 2. General circulation.*—*Author's abstract.*

10.3-257

551.543.3

Mirónovitch, Valéry, *Variabilité des moyennes mensuelles de pression au sol sur l'hémisphère Nord*. [Variability of mean monthly pressure at the ground in the Northern Hemisphere.] *La Météorologie*, Paris, Ser. 4, No. 37:11-17, Jan./March 1955. 7 figs., 3 refs. French, English and Italian summaries p. 11. DWB—Maps are presented giving the geographical distribution of mean pressure variations by months in the cold and warm seasons. A comparison is made with the monthly mean temperatures for given areas. The author

discusses the strong difference between the variability over negative action centers around the pole and variations over the seasonal Siberian center. *Subject Headings:* 1. Mean monthly pressure variations 2. Pressure variations 3. Northern Hemisphere.—A.M.P.

WIND

See: Wind (Mezentsev), 10.3-33; Wind computations at sea (Drogaitsev), 10.3-73; Wind vector calculations (Lowry), 10.3-119; Synoptic climatology of wind, Central Asia (Emm), 10.3-319.

GUSTINESS AND TURBULENCE

See also: Air-borne weather radar and turbulence in flight (Balzer), 10.3-150; Turbulent mixing and integral coefficient (Brodo), 10.3-216; Kinetic energy and energy equations (Saltzman), 10.3-220; Turbulent exch. effects on cloud structure (Kozharin), 10.3-293.

10.3-258

551.551:551.511.6:532.72

Ozmidov, R. V., O roli turbulentnykh vikhreĭ raznykh masshtabov v protsesse diffuzii. [Role of turbulent eddies of varying dimensions in the diffusion process.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2:272-273, Feb. 1958. fig., 5 refs., 6 eqs. **DLC**—The more rapid diffusion of small indicators rather than large ones is explained qualitatively by the fact that during the diffusion of small indicators small eddies also participate, but these eddies are completely overlain by large indicators, so that they cannot influence diffusion. In this quantitative examination of the problem the author, proceeding from theory of isotropic turbulence in which energy density of a part of spectrum of turbulent eddies with wave number k is expressed by $E(k) = c\epsilon^{\frac{1}{3}}k^{-\frac{5}{3}}$ (ϵ = rate of dissipation of turbulent energy and c = a numerical constant), arrives at an expression for the relationship of the mean square deviation of indicators of the magnitude h to the mean square deviation of point indicators, namely

$$\frac{\overline{\Delta l^2_{h,l}}}{\overline{\Delta l^2_{o,l}}} = \frac{\overline{v^2_{h,l}}}{\overline{v^2_{o,l}}} = \frac{\int_{1/l}^{1/h} E(k)dk}{\int_{1/l}^{\infty} E(k)dk} = 1 - \left(\frac{h}{1}\right)^{\frac{2}{3}}$$

A comparison of a theoretical curve obtained with this formula with experimental data for diffusion of three magnitudes of indicators in wind currents showed close agreement. The assumption of the isotropicity of turbulent eddies up to 4-5 m in a basin is shown to be proven. *Subject Headings:* 1. Eddy diffusion 2. Isotropic turbulence 3. Diffusion processes.—I.L.D.

10.3-259

551.551.2:551.556.2

Tanaka, S.; Tanizawa, T.; Sano, H. and Kakinuma, S. (all, Kanto-Tosan Agricultural Experiment Station, Second Agronomy), The correlation coefficient of the turbulence on the leeward of the hedges. [Studies on the wind in front and back of the shelter-hedges, Pt. 9.] *Journal of Agricultural Meteorology*, Tokyo, 13(1):7-8, July 1957. fig., eqs. In Japanese; English summary p. 8. **DWB**—When a windbreak is set up, the eddy occurs in front and back of it. In order to know the volume of the eddy, the average wind velocity and the distance covered by the eddy before it vanishes, the correlation coefficient of the turbulence is calculated as follows:

$$R_T = \frac{\Sigma(VX' \times VY')}{\sqrt{\Sigma(VX'^2) \Sigma(VY'^2)}}$$

$$VX' = VX - \bar{V}X \quad VY' = VY - \bar{V}Y$$

VX . . . the velocity of the wind at X Point; $\bar{V}X$, $\bar{V}Y$. . . Mean velocity at X and Y Point. Below 100 cm height, the correlation of $3X/H$ is seen up to $8X/H$, especially at 70 cm to $10X/H$. Above 150 cm the correlation of $3X/H$ is large at each location. As to the correlation with the standard, it is not seen up to $8 \sim 10X/H$. It is seen with $10X/H$ at 50 cm and $8X/H$ at 150 cm, respectively. If the time-correlation of 5 sec. is adopted for this eddy, the scale of the eddy is as follows: $L = R_T U = 5x(0.5 \sim 1.2) - 2.5 \sim 6.0(m)$. R_T . . . time correlation;

U . . . average velocity of wind. The height of the eddy seems to be about 1.0~1.2 m. (For Pts. 1, 2 and 4, see 8.1-253 and 8.7-22, Jan. and July 1957, *MAB*.) *Subject Headings:* 1. Shelterbelt turbulence 2. Turbulence behind windbreaks.—*Authors' abstract.*

10.3-260

551.551.25:551.576.11

Churinova, M. P., *Nekotorye kharakteristiki turbulentnosti v dni so sloistymi oblakami*. [Some turbulence characteristics on days with stratiform clouds.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, No. 54(116):31-43, 1955. 17 figs., table, 5 refs., 2 eqs. **DLC**—The quantitative characteristics of turbulence on days with stratiform clouds, such as the Richardson number, are analyzed. The Richardson criterion,

$$Ri = \frac{g(\gamma_a - \gamma)}{\bar{T} \left(\frac{dU}{dZ} \right)^2 + \left(\frac{dV}{dZ} \right)^2}$$

is replaced by $Ri = \frac{\tau}{\sigma}$, where $\tau = \frac{g}{T}(\gamma_a - \gamma)$ and $\sigma = \left(\frac{dU}{dZ} \right)^2 + \left(\frac{dV}{dZ} \right)^2$. On the basis of airplane and pilot balloon observations carried out over a 2-year period near Leningrad it was possible to compute values of τ , σ and γ . The characteristics of turbulence during the winter and summer season were determined and variations of Ri , τ , σ and γ are presented in graphs for days with Sc, Ns and St clouds and for single and multiple layer clouds. The greatest development of turbulence on days with stratiform clouds was observed below the clouds. In Sc clouds turbulence is greater than in St clouds, particularly during the warm season. The weakest development of turbulence in single layer clouds occurred at the upper boundary of the clouds, but in the case of multilayer clouds it occurred in the upper layer. The coefficient of turbulence up to the geostrophic wind level is somewhat smaller on clear days (cold half of the year) than on cloudy days. *Subject Headings:* 1. Stratiform cloud formation 2. Atmospheric turbulence 3. Turbulence in clouds.—*I.L.D.*

10.3-261

551.551.5:551.557.2:656.7

Parker, A. E., [Discussion of] J. Clodman: Anisotropic high-level turbulence [and] Reply by Clodman. *Royal Meteorological Society, Quarterly Journal*, 84(360):180-182, April 1958. 4 refs. **DWB, DLC**—PARKER disputes CLODMAN's statement that the cause of bumpiness varying with direction of flight (see 8.6-247, June 1957, *MAB*) was quasihorizontal gusts. He calculates the gust speed needed to produce 0.5 g acceleration as:

<i>Aircraft Speed</i>	<i>Gust Speed</i>
200 kt	45 kt
300 kt	67.5 kt
400 kt	90 kt.

These values he thinks are much too large to be encountered, even at 34,000 ft where a sharp edged vertical gust of 9 kt would produce a vertical acceleration of 0.5 g, but where even a rare sharp edged horizontal gust would only produce 0.05 g or very slight turbulence. CLODMAN disagrees and maintains that the gusts in the free air are very sharp and can be of high velocities, and the effect of gusts depends on their frequency as much as on their speed. Also such gusts would not need to be usual but, if encountered rarely, would be of importance. *Subject Headings:* 1. Upper air turbulence 2. Horizontal gusts.—*M.R.*

HORIZONTAL DISTRIBUTION AND WIND VARIATIONS

See also: Land and sea breeze effects, Usedom, East Germany (Zenker), 10.3-7; Wind regime, South Ukraine (Navrotskaia, Raevskii), 10.3-84; Global radiation-wind-visibility relationships, Köln, Germany (Band), 10.3-240.

10.3-262

551.552:551.542

Weiller, A. R., *L'angle du vent avec l'isobare*. [Wind angle in relation to the isobar.] *Journal Scientifique de la Météorologie*, Paris, 8(29):7-16, Jan./March 1956. 6 figs., 2 tables, 11 refs., 25 eqs. French, English and Spanish summaries p. 5. **DWB**—Diurnal and seasonal

variations (frequencies) in the angle between the wind and the isobars are calculated and shown graphically for data from Alençon, Beauvais and Romilly surrounding the station Magny-les-Hameaux. The values obtained are discussed in relation to stability and viscosity and Prandtl's theory of friction in the boundary layer. *Subject Headings:* 1. Wind-isobar angle 2. Wind shear 3. Turbulent friction 4. Magny-les-Hameaux, France.—*From author's abstract (M.R.).*

10.3-263

551.553.1(438)

*Januszewski, Józef, *Przebieg dobowy predkości wiatru we Wrocławiu*. [Diurnal wind speed variations at Wrocław.] *Wrocławskie Towarzystwo Naukowe, Prace, Ser. B*, No. 90, 1957. 60 p. 5 charts, 18 tables, 8 refs. DWB (M09.3 J35p)—Results of study of mean diurnal, monthly and yearly wind speed variations at Wrocław for the period 1946-1949, carried out with the aid of a Fuess contact anemograph registering mean speeds of winds, are presented and discussed. The air vane of the instrument was installed on the roof of the building at 20.78 m height. A large number of tables and graphs illustrate the results of the study. *Subject Headings:* 1. Diurnal wind velocity variations 2. Wrocław, Poland.—A.M.P.

10.3-264

551.553.11(94)

Reid, D. G. (*Div. of Met. Physics, C.S.I.R.O., Melbourne*), *Evening wind surges in South Australia*. *Australian Meteorological Magazine*, Melbourne, No. 16:23-32, March 1957. 8 figs., 3 refs. DWB—Anemograph traces made at Renmark and records at other places in S. Australia show, during Nov.-April, sudden surges of southerly wind up to 30 mph resembling the onset of the sea breeze during the evening, at a time when there should be a lull. Frequency histograms show time of onset (19h-23h) as 14-18 hours after sunrise and cessation at 23h to 03h or a usual duration of 1-6 hours. Wind direction roses, histograms of wind speed and maximum gusts, vector changes and frequency per month are also presented. A series of curves showing the diurnal course of mean, hourly wind speed for Cape Northumberland, Naracoorte, Lameroo, and Kingston provide evidence of the origin of the surge in coastal regions and the propagation toward the interior reaching a maximum development 50-70 mi inland (Renmark is further inland than any of the other stations). The possibility of the surges being due to katabatic or drainage winds is thus eliminated. A graph of time of onset vs distance from coast (0-200 mi) further bears out this explanation. *Subject Headings:* 1. Sea breeze penetration inland 2. Evening wind surge 3. Renmark, S. Australia.—M.R.

10.3-265

551.553.8:551.509.34(545)

*Bhalotra, Y. P. R. (*Regional Met. Center, New Delhi*), *Some features of squalls at Delhi*. *Indian Journal of Meteorology and Geophysics*, Delhi, 8(2):169-182, April 1957. 12 tables, 2 refs. DWB, DLC—The paper contains a discussion on the local upper winds and the upper air temperatures and humidities on the days of squalls and the mechanism of squalls at Delhi. The direction of upper winds at various levels and in different months, which are favorable for the development of squalls, has been stated. The correspondence between the direction of the upper winds at various levels and the direction of the following squall has also been given. An examination has been made of the relevant radiosonde data available from the routine ascents at New Delhi and the changes occurring in the upper air temperatures and humidities, prior to the passage of squalls, noted. Synoptic charts for the squally days have been studied in detail and the main factors responsible for the occurrence of squalls in different seasons are stated. *Subject Headings:* 1. Upper air analysis of squall development 2. Synoptic conditions for squall formation 3. Delhi, India.—*Author's abstract.*

10.3-266

551.553.8:551.508.53

Hounam, C. E. (*Central Office, Melbourne*), *Treatment of extreme surface winds*. *Australian Meteorological Magazine*, Melbourne, No. 20:1-15, March 1958. 2 figs., 2 tables, 11 refs. DWB—Even though reliable anemometers have been installed at many key points, the interpretation of extreme wind gust data is rendered difficult by the nature and variations of the exposure of the instrument in many cases and by the short period of record which makes reliable statistical treatment doubtful. The applicability of recorded data to a different site is another uncertainty even within the same climatic zone. Furthermore, doubt is cast on the

practice of adjusting extreme wind gust velocities to another height and it is concluded that constancy in exposure, provided it is reasonably good, is of prime importance. Gust structure is also discussed, with an example of a phenomenal wind at Lord Howe Island, whilst a few other exceptional winds are listed, notably some tornadic squalls experienced over southern Australia during the last three or four years. *Subject Headings:* 1. Extreme winds 2. Anemometer exposure 3. Anemometer accuracy 4. Gust structure 5. Lord Howe Island.—*Author's abstract.*

10.3-267

551.553.8:551.577.2

Sorochan, O. G., *K voprosu o prirode letnikh osadkov mussonnoi oblasti Vostochnoi Azii.* [Nature of summer precipitation in the monsoon region of eastern Asia.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, 72:92-109, 1957. 9 figs., 6 tables, 12 refs. **DLC**—The results of a detailed analysis of synoptic-aerological data for the period 1949-1954 show that the summer precipitation maximum (which is closely connected with the cyclonic activity) of the East Asian monsoon region is nonhomogeneous in its composition. This is caused by existence of phases of summer monsoons. The nature and the type of precipitation in the period of greatest rainfall is very close to the type of "pouring" rains. This is one of the proofs of the common nature of temperature-and-tropical zone monsoons. *Subject Headings:* 1. Monsoon rainfall 2. Synoptic-aerological analysis 3. Eastern Asia.—*A.M.P.*

SPECIAL WINDS AND WIND EFFECTS

See also: Shelter belt effects on rice paddies (Kawamata et al.), 10.3-87; Shelter belt turbulence (Tanaka et al.), 10.3-259.

10.3-268

551.555.3:551.509.3(47)

Evseev, P. K., *O prirode letnikh sukhoveev na iugovostoke Evropeiskoi chasti Sovetskogo Soiuza.* [Nature of summer dry winds in the southeastern part of the European U.S.S.R.] (In: *Akademiia Nauk SSSR. Institut Geografii, Sukhovei ikh proiskhozhdenie i bor'ba s nimi.* Moscow, 1957. p. 106-116. 3 figs., 4 tables, 11 refs.) **DLC** (QC940.RA6)—In order to refute the idea published in recent Soviet literature that "sukhovei" weather, occurring in the summer in the south and southeastern part of European U.S.S.R., is caused by the transport of dry-air masses from semi-desert and desert regions of Central Asia, the author has analyzed atmospheric processes from 1938 to 1952 and has selected 21 natural synoptic periods during which intensive dry winds were observed in summer. A study of 99 air-particle trajectories during this period has proven that the origin of dry winds is always determined by the formation of a warm high anticyclone over the central, eastern or southeastern part of European U.S.S.R. *Subject Headings:* 1. Sukhovei 2. Synoptic conditions for sukhovei 3. Southern U.S.S.R.—*A.M.P.*

10.3-269

551.555.3:551.515.83:551.557.2(584)

Kuvshinova, K. V., *O roli vynosa vozdukhnykh mass iz Srednei Azii pri obrazovanii sukhoveev v Prikaspii.* [Role of the transport of air masses from Central Asia in the formation of dry winds in the pre-Caspian region.] (In: *Akademiia Nauk SSSR. Institut Geografii, Sukhovei ikh proiskhozhdenie i bor'ba s nimi.* Moscow, 1957. p. 117-130. 6 figs., 6 tables, 15 refs.) **DLC** (QC940.R9A6)—A detailed study of this role was carried out in 1952 by the Department of Climatology and Hydrology of the Institute of Geography of the Academy of Sciences of the U.S.S.R. 272 trajectories of air-mass transport during 144 days with $\geq 30^{\circ}\text{C}$ temperature and ≥ 35 mb moisture deficiency were constructed and analyzed. It was found that only 12.5% of the constructed trajectories indicate the transport of air masses from Central Asia. *Subject Headings:* 1. Sukhovei 2. Air mass transport 3. Air trajectory studies 4: Caspian Region, U.S.S.R.—*A.M.P.*

10.3-270

551.555.8:551.577.38(584.6)

Samokhvalov, N. F., *Klimaticheskaiia kharakteristika sukhoveev Kazakhstana.* [Climate characteristics of dry winds in Kazakhstan.] (In: *Akademiia Nauk SSSR. Institut Geografii, Sukhovei ikh proiskhozhdenie i bor'ba s nimi.* Moscow, 1957. p. 51-58. 2 figs., 9 refs.)

DLC (QC940.R9A16)—The author discusses the time of appearance and the duration of dry-wind spells in various regions of Kazakhstan: the forest-steppe zone, northern Kazakhstan, the southern and central parts, and the desert regions. A study of available meteorological data for several decades shows that as one moves south, especially from the 48th parallel to the Turan lowland, a steady increase of the number of days with dry winds during the last few decades can be observed. This might be attributed to the warming up observed in the Arctic regions lately. *Subject Headings: 1. Sukhovei 2. Kazakh S.S.R.—A.M.P.*

10.3-271

551.555.9(47)

Chubukhov, L. A., *Dinamika mestnoi pogody v periody obrazovaniia sukhoveino-zasushlivykh kompleksov*. [Dynamics of local weather during the period of formation of dry wind-drought complexes.] (In: Akademiia Nauk SSSR. Institut Geografii, *Sukhovei ikh proiskhozhdenie i bor'ba s nimi*. Moscow, 1957. p. 138-143. 3 tables, 7 refs.) **DLC** (QC940.R9A6)—A study of the dynamics of local weather was carried out in the southeastern part of European U.S.S.R. It shows that an increase of the mean daily air temperature during the periods of transformation, at the end of which drought ("sukhovei") weather is being formed, can be very considerable. The author notes that other arid periods, at the end of which no arid ("sukhovei") weather complexes occurred, were not investigated. *Subject Headings: 1. Sukhovei 2. Southeastern U.S.S.R.—A.M.P.*

UPPER AIR WINDS

See: Circulation index changes (Defant, Taba), 10.3-23; *Missile design wind profiles, Florida and Mass.* (Sissenwine), 10.3-30; *Jet stream and jet aircraft operation* (Reiter), 10.3-80; *Upper air wind computations* (de Jong), 10.3-123; *Upper air wind measurement* (Malet), 10.3-124; *Ionospheric drift, Akita, Japan* (Ogata), 10.3-204; *Jet stream-pressure relationships* (Pogosian), 10.3-226; *Jet streams and squall lines* (Georgii), 10.3-228; *Upper air turbulence* (Parker), 10.3-261; *Sukhovei and air mass transport, Caspian Region, U.S.S.R.* (Kuvshinova), 10.3-269.

VERTICAL MOTION

10.3-272

551.558.21

Gazzola, A., *Sur la variabilité avec l'altitude du paramètre l^2 lors de la formation d'ondes de relief*. [Variability of parameter l^2 with altitude in lee wave situations.] *Schweizer Aero-Revue*, Berne, 32(4):217-220, 1957. 4 figs. **DLC**—Parameter l^2 , introduced by SCORER in his theory concerning lee waves, has been calculated according to altitude for several soundings made at Rome when conditions were favorable for glider flights, and more particularly for flights at high altitudes. *Subject Headings: 1. Lee waves 2. Glider flights 3. Rome, Italy.—A.V.*

10.3-273

551.558.21(793):551.524.7(793)

§Klieforth, H., *Meteorological aspects of the Sierra Wave*. *Schweizer Aero-Revue*, Berne, 32(3):149-156, 1957. 12 figs., 2 tables, 4 refs., 2 eqs. **DLC**—Report on aerological measurements made with a glider during a Scientific Study Session organized by the Faculty of Meteorology of the Univ. of Calif. at Los Angeles (Calif.) in 1951-1952. Tables, transversal sections (profiles with streamlines), aerological soundings and meteorological charts illustrate the note. Among the conclusions, those concerning the altimetric errors are of a particular interest to aviation. Successively examined, we find: synthesis of tracking and air-borne data, vertical cross sections, synoptic fields, pressure fields and altimeter errors. *Subject Headings: 1. Orographic disturbances 2. Upper air temperatures.—A.V.*

10.3-274

551.558.21:551.557.5

Murakami, T. (*Met. Res. Inst.*), *The topographical effect upon the stationary upper flow patterns*. *Papers in Meteorology and Geophysics*, Tokyo, 7(2):69-89, July 1956. 10 figs., 10 refs., 62 eqs. **DWB**—During winter, there are three marked maxima of wind speed centered at (150°E, 30°N), (70°W, 40°N), and (40°E, 25°N), respectively. The present numerical analysis suggests that these wind maxima have some dynamical relation with the mountains,

such as the Himalayas and the Rocky Mts. In June, upper westerlies generally split into two branches over the western part of the Pacific. By an inspection of the computed flow patterns for June, we have an impression that the splitting of the jet streams over the Far East is mainly caused by the effect of the Himalayas. *Subject Headings:* 1. Air flow over mountains 2. Orographic effects on upper flow 3. Jet stream splitting 4. Himalayas.—*Author's abstract.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

HUMIDITY

See also: Moisture effects on maize (Savzdarg), 10.3-85; Transmission of light through water vapor (Yamamoto, Sasamori), 10.3-246; Temp. profiles and refractive index (Elmes), 10.3-251; Visibility-dew point spread relationships, Air Force Base, La. and Germany (Appleman), 10.3-323.

10.3-275

551.571:551.511:551.577.2(47)

Grigor'eva, A. S., *Vlagooborot na iuge Evropejskoj territorii SSSR v kholodnyj period.* [Moisture exchange in south European U.S.S.R. during the cold period.] *Leningrad. Glavnaja Geofizicheskaja Observatoriia, Trudy*, 70:38-47, 1957. 3 figs., 6 tables, 11 refs. **DLC**—A study of the quantitative characteristics of the moisture exchange in the atmospheric layer from the earth surface to 7 km height, during the winter 1952/53 when the amount of precipitation was above normal, is presented. The results of the study show that the distribution of precipitation is mainly conditioned by circulation factors, which also affect the direction of the movement of air masses whose moisture content determines precipitation amounts. *Subject Headings:* 1. Moisture exchange 2. Winter circulation effects on precipitation 3. Precipitation distribution 4. European U.S.S.R.—*A.M.P.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: Evaporation from reservoirs, Central Siberian Plateau (Afanas'ev), 10.3-118; Energy balance method of evaporation calculation (Tomitaka), 10.3-214.

10.3-276

551.573:551.579

Abramova, M. M.; Bol'shakov, A. F.; Oreshkina, N. S. and Rode, A. A., *Isparenie iz pochvy podveshennoi vlagi.* [Evaporation of suspended water from the soil.] *Pochvovedenie*, Moscow, No. 2:27-41, 1956. 9 figs., table, 9 refs. French summary p. 4 of its Supplement. Trans. into English available Special Libraries Association Translation Center (John Crerar Library, Chicago) as its R-3908. **DLC**—An extensive study was made of the evaporation of water suspended from the soil, both under laboratory and field conditions. The behavior of this water in different types of soils was examined. It is shown that the retention of suspended water in the soil is a function of its mechanical composition and structure of the soil and its movement through the soil during evaporation varies with the soil characteristics. A detailed analysis, illustrated graphically, is given of the evaporation of moisture from different soil types. *Subject Headings:* 1. Evaporation from soil 2. Soil types.—*I.L.D.*

10.3-277

551.573

Savina, S. S., *Sviaz' mezhdru ispareniem i ispariaemost'iu pri dostatochnom uvlazhnenii pochvy.* [Relation between evaporation and potential evaporation with adequate soil moisture.] *Meteorologiya i Gidrologiya*, Leningrad, No. 10:28-30, Oct. 1957. fig., table, 7 refs., 3 eqs. **DWB, DLC**—Using the method of heat balance, the author attempts to verify experimentally the assumed fact that, with adequate soil moisture, evaporation and potential evaporation from a plant cover are identical. The evaporation rate is obtained from the equation $E = \frac{(R-B)\Delta e}{0.64\Delta t + \Delta e}$, and potential evaporation from a plant cover by $E_0 = \rho D(\beta e_0 - e)$.

By incorporating the latter equation into the radiation balance equation, the latter is solvent

so that e_0 and e are determined. D , the coefficient of exchange is determined from $D = cu$ where c is the coefficient of proportionality and u , wind velocity; β is the product of two factors, α which is the mean relative humidity of the air at the boundary of the plant cover and γ which appears in the nonlinear relationship between maximum tension of water vapor and air temperature. A table giving values of c and β , and a graph showing the relationship of evaporation and potential evaporation are presented. In the presence of adequate soil moisture these two quantities are equal on a range of 0.1 to 0.125 mm/hour. Also the parameter β is independent of meteorological conditions in determining potential evaporation. *Subject Headings: 1. Evaporation from plant cover 2. Potential evapotranspiration.—I.L.D.*

10.3-278

551.573:551.482

Schmuck, Adam, **Pomiary parowania na odrze pod wrocławiem (Komunikat wstępny).** [Measurement of evaporation of the Oder near Wrocław, Pt. 1.] *Przegląd Geofizyczny*, Warsaw, 2(1/2):33-39, 1957. 4 figs., 2 tables, 4 refs. French summary p. 39. **DWB, DLC**—Preliminary results of evaporation measurements of Oder River waters near Wrocław carried out with the aid of a Soviet GGI evaporimeter in the period July 1954-Oct. 1956 are presented and discussed. It has been found that the amount of evaporated water in summer is three times greater than it is in the winter period, and that evaporation declines with the increase of altitude. *Subject Headings: 1. Evaporation from rivers 2. Evaporimeters 3. Oder River, Poland.—A.M.P.*

CONDENSATION

See also: Cloud physics journals, 10.3-36; Photoelectric photometers and aerosol particle spectrum (Mikirov), 10.3-188.

10.3-279

551.574.1

Keily, D. P., **Some observed natural cloud drop distributions.** Mass. Institute of Technology. Dept. of Meteorology. Instrument Laboratory, Contract AF 19(604)-1287, Scientific Report No. 6, Dec. 15, 1957. 8 p. 8 figs., 2 tables, 7 refs. **DWB**—Drop size distributions in natural cloud have been observed by an air-borne electric charge probe and an oiled glass slide drop catcher. In general, drop counts increase toward the minimum size measurable by the instruments, which is about two microns. *Subject Heading: 1. Cloud droplet size distribution.—Author's abstract.*

10.3-280

551.574.1:551.594.253

Kinzer, Gilbert D. and Cobb, William E. (both, Office of Phys. Research, U. S. W. B.), **Laboratory measurements and analysis of the growth and collection efficiency of cloud droplets.** *Journal of Meteorology*, Boston, 15(2):138-148, April 1958. 6 figs., 2 tables, 16 refs., 23 eqs. **DWB, DLC**—Water droplets initially 2μ in radius were held stationary for observation in an upward streaming cloud and were found to grow by accretion. The rate of increase in the radius of individual droplets was measured from 4 to 65μ . Experimental collection efficiencies obtained from the data agree within limits of experimental error with those calculated from a theory that is developed from intuitive physical arguments which are based on a superimposed random motion observed in the fall of droplets in the supporting cloud. The theory implies that a small scale eddy diffusion transfers small droplets from the parent cloud to the growing droplet. The coefficient of droplet transport calculated from the theory agrees well with one evaluated experimentally. Past measurements of drops growing by accretion from 100μ to 1.5 mm in radius have been combined with the results of the present investigation in order to compare the efficiencies calculated by the new theory with measured values over a more extensive range. The free water content and the temperature of the parent cloud were approximately 3.5 gm m⁻³ and 22°C, respectively. Two types of distributions were employed: the first with 80% of the free water contained in droplets 5.5 to 8.0μ in radius; and the second with the free water distribution more widely among droplets 3.9 to 10.4μ in radius. The droplets of the parent cloud were produced by atomization of water and were randomly electrified. The electrification was found to be of a magnitude similar to that measured recently on droplets in some types of natural cumuliform clouds. It is shown that the electrification was too small to produce dynamic effects of more than one-tenth of the order of magni-

ude of those associated with the eddy transfer, although coalescence may be promoted by electrical forces whenever eddy diffusion transports droplets to within 2 or 3μ of the growing droplet. *Subject Headings:* 1. Cloud drop growth 2. Cloud droplet coalescence 3. Electrification of cloud droplets.—*Authors' abstract.*

10.3-281

551.574.1:551.578.11

Krustanov, L. (*Sofia*), A nem teljesen megnedvesíthető kondenzációs magvak hatékonyságáról. [Effectiveness of semi-adsorbent condensation nuclei.] *Időjárás*, Budapest, 1(5):333-338, Sept./Oct. 1957. 3 figs., 6 refs., 14 eqs. English summary p. 333. Russian version p. 390-394. **DLC**—A mathematical analysis of the forces and energies involved in the process of droplet formation shows that, under a certain size limit of the nucleus, its dimensions are to be considered as a more important factor for the production of a droplet than its adsorbent properties. *Subject Headings:* 1. Drop formation 2. Drop size 3. Nuclei adsorption properties.—*From author's abstract.*

10.3-282

551.574.1:553.61

Mason, B. J. and Maybank, J. (*both, Imperial College, London*), Ice-nucleating properties of some natural mineral dusts. *Royal Meteorological Society, Quarterly Journal*, London, 4(361):235-241, July 1958. 2 figs., 2 tables, 20 refs. **DWB, DLC**—A fairly wide range of 28 naturally-occurring mineral dusts has been tested for ability to act as ice nuclei. Nineteen substances, mainly silicate minerals of the clay and mica groups, are found to be effective at -18°C ; seven of these are active above -10°C . The most abundant of these is kaolinite with a threshold temperature of -9°C . Ten of the 28 substances, again mainly silicates, are found to become more efficient ice nuclei having once been involved in ice-crystal formation, i.e., they can be preactivated. Thus, ice crystals grown on kaolinite nuclei, which are initially active at -9°C , when evaporated and warmed to near 0°C in a dry atmosphere, leave behind nuclei which are thereafter effective at -4°C . Particles of montmorillonite, another important constituent of some clays and initially inactive even at -25°C , may be preactivated to serve as ice nuclei at temperatures as high as -10°C . It is suggested that, although such particles can initially form ice crystals only at cirrus levels, when the ice crystals evaporate they may leave behind some 'trained' nuclei which may later seed lower clouds at temperatures only a few degrees below 0°C . On this hypothesis, the fact that efficient nuclei are occasionally more abundant at higher levels would not necessarily imply that they originate from outer space; indeed, in view of the poor nucleating properties of some meteoritic material that was tested, it appears that atmospheric ice nuclei are predominantly of terrestrial origin, with the clay minerals, particularly kaolinite, a major source. *Subject Headings:* 1. Mineral dust nuclei 2. Ice nuclei 3. Clay minerals.—*Authors' abstract.*

10.3-283

551.574.11:551.508.91

Georgii, Hans-Walter, Relations between ice nuclei and particles of atmospheric aerosols. Frankfurt/Main. Univ. Institut für Meteorologie und Geophysik, Contract AF 61(514)-927, Technical Note (un-numbered), May 1957. 20 p. 20 figs., 16 refs., eqs.—The following report summarizes the results of current measurements of natural freezing nuclei carried out in a mixing cloud chamber during the last year at Frankfurt a.M. Simultaneously, measurements of the concentration of atmospheric condensation nuclei in different size ranges separately were carried out. The investigations showed the following new results: These results are valid for the freezing nuclei becoming active within the temperature range 0°C to -30°C . The concentration of freezing nuclei shows an annual trend with a maximum concentration during winter. This trend is in good agreement with investigations by W. RAU and V. SCHAEFER. The existence of a diurnal trend of the freezing nuclei concentration was detected. It parallels the diurnal trend of "large" condensation nuclei (radius $>0.1\mu$) and is inverse to the diurnal trend, of Aitken nuclei (radius $<0.1\mu$). There exists a good correlation between number of freezing nuclei and number of "large" condensation nuclei, but no relation between freezing nuclei and Aitken nuclei. Obviously the Aitken nuclei become effective for the freezing process only at temperatures below -30°C . The importance of the "large" condensation nuclei for the ice nucleation in supercooled clouds is supported by direct impaction

methods. Retention of "large" nuclei from the air sample investigated in the cloud chamber leads to a reduction of 80% of the rate of freezing nuclei. *Subject Headings: 1. Nuclei effectiveness 2. Cloud chamber experiments.—Author's abstract.*

10.3-284

551.574.11 (52)

Miura, Akira (*Geophysical Inst., Tôhoku Univ.*), **Size distribution of large aerosol particles in the atmosphere.** *Tôhoku Univ., Science Reports, 5th Series, Geophysics*, 8(1):58-63, Nov. 1956. 4 figs., 2 tables, 9 refs., eqs. DWB, DLC—Observations of atmospheric aerosols were made at Sendai by a settling method. On the basis of the observations, we obtained the size distribution of natural aerosols, hygroscopic particles and sea salt particles in the air. They showed the relation of these particles. *Subject Heading: 1. Aerosol size distribution 2. Sendai, Japan.—Author's abstract.*

10.3-285

551.574.11

Montmory, R. and Jaffray, J., **Sur les propriétés glaçogènes de l'iodure d'argent.** [Ice-forming properties of silver iodide.] *Académie des Sciences, Paris, Comptes Rendus*, 246(9):1391-1394, March 3, 1958. 7 refs. DLC—Experiments demonstrate that the threshold of ice-forming action varies with the circumstances accompanying the emission of silver iodide particles. This fact seems to prove the interrelations of the surface states. The ice-forming properties of dispersed silver iodide vary if it previously acts, or not, as condensation nuclei. They also vary according to the composition of the atmosphere in which it has been dispersed and where it acts; and according to the temperature and type of generator from which it has been dispersed. *Subject Headings: 1. Silver iodide effectiveness 2. Condensation nuclei 3. Cloud seeding.—A.V.*

10.3-286

551.574.11

*Squires, P. and Twomey, S. (both, *Div. of Radiophysics, C.S.I.R.O., Australia*), **Som observations of sea-salt nuclei in Hawaii during Project Shower.** *Tellus*, Stockholm, 9(4):538-540, Nov. 1957. fig., 2 tables, 5 refs. DWB—Slides were exposed for times ranging from 30 to 975 sec during traverses by the RAAF Dakota through the orographic clouds at the Saddle in Hawaii on 9 occasions from Nov. 25 to Dec. 3, 1954 and the data tabulated and analyzed and compared with data obtained by Woodcock over the sea. It can be seen that the sea salt nucleus content of air over the Saddle is less than that over the sea at the same level and is less than that near the sea surface from which the Saddle air came. It is concluded that most of the sea salt is rained out as it crosses the coast and is lifted to the Saddle. However, the vertical decrease in salt is less than on the Australian coast, as the trade wind cumuli tend to produce more mixing. *Subject Headings: 1. Project Shower, Oct.-Dec. 1954 2. Sea salt nuclei data 3. Aircraft soundings in clouds 4. Hawaii.—M.R.*

10.3-287

551.574.11

Woodcock, Alfred H. (*Woods Hole Oceanog. Inst., Mass.*), **Atmospheric sea-salt nuclei data for Project Shower.** *Tellus*, Stockholm, 9(4):521-524, Nov. 1957. table, 9 refs. DWB—This report presents, without discussion, extensive data on the distribution of sea salt nuclei in Hawaii during the field activities of Project Shower. References to studies and digests of similar data from this region are given. It is pointed out that one of the major purposes of obtaining these data, simultaneously with the other data presented in this volume was to test an hypothesis of raindrop formation by tracing the salts in the nuclei to the salt in solution in the raindrops. The reader is invited to use these data for this or other purposes. *Subject Headings: 1. Project Shower, Oct.-Dec. 1954 2. Raindrop formation 3. Sea salt nuclei data 4. Hawaii.—Author's abstract.*

10.3-288

551.574.14:551.574.11

Ballard, O. R. and Quan, B. (both, *D. Napier & Sons, Ltd. and Natl. Res. Council of Canada*), **Ice crystals: a new icing hazard.** *Canadian Aeronautical Journal*, Ottawa, 4(1):11-17, Jan. 1958. 12 figs., 3 refs., 3 eqs. DLC—Recent flight experience in ice crystal clouds has focused attention on an icing problem previously ignored. The nature of these clouds and the effect of crystal ice formation on anti-icing systems designed for supercooled droplet icing

are considered. Various methods of simulating icing conditions are reviewed and the methods used at the National Research Council of Canada for full scale gas turbine tests are described. The importance of ice detection systems which distinguish between supercooled and ice crystal clouds is pointed out. More extensive meteorological data concerning the occurrence of ice crystal and mixed clouds is required to predict the likely frequency of encounters. The severity of the problem can then be assessed in the light of this further data. *Subject Headings:* 1. Ice crystal formation 2. Icing research.—*Authors' summary.*

10.3-289

551.574.42

Kachurin, L. G., *Obrazovanie gololeda i izmorozhi v pereokhlazhdennom tumanе.* [Formation of glaze and rime in a supercooled fog.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, 57(119):50-55, 1956. 4 refs., 5 figs. **DLC**—The author discusses the mechanical processes involved in the setting of supercooled water drops upon objects in the formation of glaze or rime in a fog. The frequency of occurrence of glaze and rime in fogs in relation to the climatological frequency of fogs at negative temperatures, and the influence of size of fog droplets and degree of supercooling upon the form of rime and glaze are discussed. Also, the role of wind velocity is considered. *Subject Headings:* 1. Glaze formation 2. Rime formation 3. Supercooled fog.—*I.L.D.*

10.3-290

551.574.7(52)

Yamada, N. and Sakai, S., *On the possibility of occurrence of icing condition in lower levels over the selected stations in Japan.* *Journal of Meteorological Research*, Tokyo, 9(12): 885-889, Dec. 1957. 9 figs., table. In Japanese; English summary p. 885. **DWB, DLC**—The possibility of occurrence of icing condition over 12 selected stations in Japan is calculated from the aerological data (0h, 12h) for two years, 1953-1954. The icing condition adopted in this report is defined as a meteorological condition in which the occurrence of icing is expected, that is a condition with the high relative humidity more than 80% and the temperature ranges less than 0°C and more than -15°C. In conclusion, the seasonal frequencies of occurrence of icing condition at the selected constant pressure altitudes (800, 700, 600 and 500 mb) are obtained. *Subject Headings:* 1. Icing condition frequencies 2. Japan.—*Authors' abstract.*

FOG

See also: Infrared transmission through fog (Saitô), 10.3-245; Visibility-dew point spread relationships, Air Force Base, La. and Germany (Appleman), 10.3-323.

10.3-291

551.575.1(472)

†*Krasikov, P. N. and Chikirova, G. A., *Mikrofizicheskie kharakteristiki mestnykh tumanov.* [Microphysical characteristics of local fogs.] *Leningrad. Glavnaia Geofizicheskaiia Observatoriia, Trudy*, 57(119):88-100, 1956. 9 figs., table, 11 refs. **DLC**—Special meteorological observations were carried out in the vicinity of Leningrad during the summer and fall months of 1951-1953 in order to obtain data on the size distribution of drops and the water content of radiational fogs. Data are presented also on the structure of evaporation fogs that form during the winter over nonfreezing water surfaces in polar regions. The Soviet literature on the formation and characteristics of fogs is reviewed briefly and the observational data, which included observations of temperature at surface of the ground, observations on air temperature and humidity, wind velocity and direction, cloudiness and height of fogs, drop size and water content of fogs are presented in graphs and tables. It was found that radiational, summer and fall fogs generally form during anticyclonic weather, stable stratification (temperature inversion) of the air layer near the ground, high relative humidity during evening hours, absence of cloudiness and low wind velocity. In all cases, dew formation was observed 2-5 hrs before the occurrence of radiational fog except when rain occurred before the fog. The spectrum of size distribution of drops depends upon the duration of the fog. The observed evaporation at negative temperatures indicates that the microstructure of fogs depends upon their temperature and water content. *Subject Headings:* 1. Radiation fog 2. Fog drop size distribution 3. Fog formation 4. Leningrad, U.S.S.R.—*I.L.D.*

eight (except the usual method which is very subjective), the author suggests the introduction of the nephoscopic method, based on the logarithmic law of wind distributions with height, and describes the methods and results of comparative observations of cloud height obtained by the improved nephoscopic method and with pilot balloons. The difference does not exceed $\pm 10\%$, and the nephoscopic method is much simpler and cheaper. In order to obtain more precise data of cloud height and to determine the position of the cloud over the horizon it is necessary to use at least a goniometer. For determining the speed of the lower wind it is preferable to use anemometers rather than wind cones. *Subject Headings: 1. Cloud height measurement 2. Nephoscopes.—A.M.P.*

PRECIPITATION

See also: Rainfall intensity-frequency data, Southeastern States, 10.3-11; Radar precip. measurement bibliog., 10.3-68; Monsoon rainfall, Eastern Asia (Sorochan), 10.3-267; Sukhovei, Kazakh, S.S.R. (Samokhvalov), 10.3-270.

10.3-295

551.577.37 (944,943)

Newman, B. W. (*Divisional Office, Brisbane*), **Australia's highest daily rainfall.** *Australian Meteorological Magazine*, Melbourne, No. 20:61-65, March 1958. 2 figs., ref. DWB—A surface synoptic chart for 9:00 a.m. Feb. 1, 1893 shows the deep low which later gave rise to the 35.71 in. (24-hr) of rainfall at Croyhamhurst N.N.W. of Brisbane, N.S.W.; the heaviest ever recorded in Australia. The possibility that this value would have been exceeded if the Bald Knob station (established in 1928) had been in operation is debated on statistical grounds and found to be less likely than at first glance. Additional heavy rains in Feb. 1893 gave Croyhamhurst 107.60 in. for the month (10.78 in. on 1st, 20.06 in. on 2nd, 35.71 on 3rd and 10.76 in. on the 4th of Feb.). Landsborough, Mooloolah and Woodford, in the vicinity, had comparable heavy daily totals on the 3rd. Brisbane had wettest month on record (40.39 in.). These are figured to be one in 700 yr rainfalls. *Subject Headings: 1. Record daily rainfall 2. Rainfall extremes 3. Croyhamhurst, N.S.W. 4. Brisbane, Australia.—M.R.*

10.3-296

551.577.37:551.577.61:551.579.4(52)

Ohsawa, Koichiro and Ozaki, Koichi (*Nagasaki Marine Obs.*), **Some comments on the isohyetal maps of the heavy rainstorm of July 25, 1957, around the city of Isahaya.** *Oceanography and Meteorology*, Nagasaki, 8(1/2):Paper No. 8, Dec. 1957. 2+ p. DLC—The rainfall analyzed in this report with the help of isohyetal maps was associated with a convective thunderstorm. The area affected by the unusual precipitation was 20×40 km in size. Precipitation up to 104.5 mm an hour and over 20 mm in 10 min. was recorded. The rainfall resulted in a disastrous flood with over 600 killed and over 10,000 houses inundated. The maps are based on data from a dense network of 50 stations. *Subject Headings: 1. Excessive rainfall 2. Isohyetal charts 3. Rainfall analysis 4. Flood damage 5. Isahaya, Japan.—G.T.*

10.3-297

551.577.37:551.579.1:551.509.39(521.1)

Yoshida, S. and Kobayashi, T., **Outline of the hydrometeorological investigation in the upper region of Tadami River, 1955 (the 3rd year), chiefly on estimating the average depth of precipitation over the area by the data of selected rain gages and reproducing the hydrograph of a complex storm by unit-hydrograph method.** *Journal of Meteorological Research*, Tokyo, 10(1):34-46, 1958. 17 figs., 3 tables, 5 refs. In Japanese; English summary p. 34. DWB, DLC—Main results obtained from the hydrometeorological investigation in the upper region of the Tadami River, 1955 (the 3rd year), are as follows: 1) The selection of 3-5 points of rain observation and the determination of point coefficients were successively carried out by means of least square method, so that we can readily estimate the average depth of precipitation over the area with the error less than 5% by the equation,

$$P = \sum b_i P_i,$$

where P = average depth of precipitation, P_i = point precipitation, b_i = point coefficient, where, 1) On the standard average depth of precipitation, the average depth of precipitation of all rain gages over the area by THIESSEN's method was adopted; 2) On runoff forecasting for the upper

Tadani River Basin (531 km²) at Tagakura by means of the unit hydrograph method. It is found necessary for the improvement of forecasting to use the appropriate unit hydrograph corresponding to the type of rainfall distribution. This type of rainfall distribution is defined as follows: the type of which rainfall distribution includes almost the upper part of river basin (i.e. vice versa). *Subject Headings*: 1. Rainfall depth duration area studies. 2. Rainfall forecasting. 3. Unit hydrographs. 4. Tadani River Region, Japan.—*Authors' abstract.*

10.3-266

551.577.47:551.590.311

Yoshino, I. On the cold trough with the heavy rain in July 1952. *Journal of Meteorological Research, Tokyo*, 1952, 643-664, Dec. 1953. 10 figs., table, 2 pls. In Japanese. English summary p. 645. PWR, DLC.—The author studied the cold vortices in the atmosphere when heavy rain occurred 5 times in west Japan in July 1952, and obtained following results: (1) In the half season warm air mass with the tropical tropopause at 100 mb level is located to the south of Japan and cold air mass with the subtropical tropopause at the level between 200 and 300 mb is located to the north of Japan. (2) These two cold air masses are strengthened by the arrival of a strong cold vortex from north or north-west of Japan, and the heavy rainfall often occurs at the south side of the tropopause low or double tropopause. (3) The north-south displacement of the baric form corresponds well that of cold vortex or tropopause-low. The scale of the tropopause-low or the double tropopause shows the index of the strength of jet stream, and the displacement is termed as south side of these tropopauses. *Subject Headings*: 1. Drought structure. 2. Cold vortices. 3. Rainfall analysis. 4. Sea-Us. 5. Japan.—*Authors' abstract.*

RAIN, SNOW AND HAIL

See also: Snow and avalanches. Weissbadlyoch, Switzerland. 10.3-2. Raindrops: measuring techniques. Pearson, Martin. 10.3-197. Snow: crystallites. Nakai, 10.3-165. Drought: size and radar rainfall measurement. Tamm, 10.3-166. Radar: absorption properties. Schuster, 10.3-153.

10.3-267

551.576.11:551.576.1

Ramaswami, R. and Varadachari, K. Analysis of the relation of size distribution raindrops from layer type clouds in tropics. *Meteorological Society of Japan, Trans. Jpn. Soc.* 2, 35 + 121-126, Aug. 1957. 5 figs., table, 14 pls. PWR, DLC.—A preliminary study of the size distribution of raindrops from layer type precipitation in the tropics has been made. The large deviations in the size distribution which have been ignored by past workers, are attempted to develop an empirical relationship between the frequency and intensity of rain have been examined. The large deviations from Marshall-Palmer distribution in the observed spectral distribution of drops at the ground level are explained in terms of the modified Brocaud spectrum analogies, in the intervening space between the level of origin of drops and ground due to the following factors: (1) growth of raindrops by accretion with cloud droplets, (2) differential rates of evaporation of raindrops at different rates in falling from cloud to ground and (3) coalescence between raindrops at different rates during their fall from cloud to ground. *Subject Headings*: 1. Raindrops: size distribution. 2. Tropical clouds. 3. Tropics.—*Authors' abstract.*

10.3-300

551.576

Magnus, Chell. On the falling velocity of solid precipitation elements. *Journal Japan. National University, Science Series, Ser. 2, No. 3, 53-61, March 1954. 7 p. 5 refs., 11 figs. DLC.*—The falling speed of various snow crystal types and graupel is analyzed mathematically on the basis of observations as of well-known aerodynamic principles, constants, and simple relations between the dimension, density, and falling speed of the crystals are derived. Calculations indicate that the velocity of plane dendritic, rounded, and spherical crystals is dependent of their dimensions, agreeing reasonably well with observations. Terminal velocity of graupel can be described as a function of diameter and density. Data of the observed and calculated falling speeds of various snow crystals vs. dimensions and density of graupel and snowflakes in relation to diameter are graphed. *Subject Headings*:

1. Terminal velocity of snow crystals 2. Terminal velocity of graupel 3. Snow crystal densities.—*SIPRE abstract.*

10.3-301

551.578.41(52)

Tamate, Sankijyu and Fujii, Shinichi (*Education Univ., Tokyo*), **Errors in the calculation of water equivalent of snow.** *Researches on Snow and Ice*, Tokyo, No. 2:181-184, Jan. 1955. 7 figs. 3 tables, ref., 3 eqs. In Japanese. DWB—The errors in obtaining water equivalent of snow along the Tama River basin (Tokyo and Yamanashi Pref.) are studied for 33 snow courses and 475 observation posts in a 377.90 km² area dividing the western, central and eastern parts of 3 districts, using the eq.

$$q - q_1 = \Delta h / 4 (a_1' - a_1'') \rightarrow [q - q_1 = \Delta h / 4 (a_1' - a_1'')]$$

where q is water equivalent, Δh is differential slope of iso-water-equivalent line (such as 20 mm, 30 mm) and a designated area. Δh and the errors of calculated water equivalent are related linearly, the error increases by multiple number as Δh increases from 10 mm to 20 mm, 30 mm and 40 mm. The treated data are tabulated. *Subject Headings: 1. Water content of snow 2. Tama River Basin, Japan.*—*J. H. Woo.*

10.3-302

551.578.46:551.579.2

Boyer, Peter B. and Merrill, Parley, **Storage effect of snow on the flood potential from rain falling on snow.** *U. S. Corps of Engineers. Snow Investigations, Project Cw-171, Technical Bulletin*, No. 17, Dec. 15, 1954. 13 p. 3 plates, tables, 9 refs. DWB (M79.2 U582e)—Sample computations of an estimate of the potential storage and lag time for a rain-on-snow occurrence are presented for various elevations of a drainage basin. The storage effect is determined from its heat deficiency and free-water content and is compared with the value obtained by an assigned maximum snow density. The factors affecting storage and lag time include depth of snow, physical characteristics of the snow pack, water equivalent of heat deficiency in the snow pack, and the liquid water content and retention capacity of the snow pack. No possibility appears to exist for establishing a particular maximum density at which snow pack will begin to yield runoff. A simple method is suggested for determining the temperature and structural profile of the snow without digging pits. *Subject Headings: 1. Snow cover effects on flood potential 2. Flood estimation.*—*SIPRE abstract.*

10.3-303

551.578.46:551.515.8(47)

Fel'dman, Ia. I., **Vliianie snezhnogo pokrova na pogodu i klimat.** [Effect of snow cover on weather and climate.] *Priroda*, Moscow, 46(4):89-90, April 1957. graph. DLC—Results of a study of this effect, based on meteorological data from the Russian plains in March-April including some areas covered with and some already void of snow, but both within the confines of a uniform air mass (showing that this effect depends on the physical properties of the air mass), are presented and discussed in detail. *Subject Headings: 1. Snow cover effects on weather 2. Snow cover effects on air masses 3. U.S.S.R.*—*A.M.P.*

HYDROMETEOROLOGY

See also: Rostov Hydromet. station, U.S.S.R. (Nichkevich), 10.3-57; **Maximum flood discharge calculations** (Alekseev), 10.3-116; **Evaporation from soil** (Abramova et al.), 10.3-276; **Excessive rainfall**, Isahaya, Japan (Ohsawa, Ozaki), 10.3-296; **Rainfall depth duration area studies**, Tadami River region, Japan (Yoshida, Kobayashi), 10.3-297; **Snow cover effects on flood potential** (Boyer, Merrill), 10.3-302; bibliog. on **Soil Moisture**, p. 423.

10.3-304

551.579.5(438)

Bac, Stanisław and Marcilonek, Stanisław, **La condensation de la vapeur d'eau dans le sable et dans le gravier en vue des conditions climatiques en Pologne.** [Condensation of water vapor in sand and in gravel in climatic conditions of Poland.] *Acta Geophysica Polonica*, Warsaw, 3(4):176-194, 1955. 7 figs., 6 tables, 7 refs. Polish summary p. 193-194. DWB, LC—A very detailed report on the methods, procedures, and results of a study of the water

balance in sands of different coarseness and gravel carried out with a series of lysimeters at the State Agronomic Research Station at Puławy. Long period (1926-1939 and 1941-43) observations have shown that in conditions of the Polish climate, and especially in the summer period, a replenishment of the water reserves takes place in sandy soils by infiltration of rain and snow water. *Subject Headings: 1. Water balance in sand 2. Lysimeters 3. Poland*—A.M.P.

10.3-305

551.579.5:546.791:546.432

Barker, F. B. and Scott, R. C. (both, *Water Res. Div. U. S. Geol. Surv., Denver*), **Uranium and radium in the ground water of the Llano Estacado, Texas and New Mexico.** *American Geophysical Union, Transactions*, 39(3):459-466, June 1958. 6 figs., 8 refs., 3 eqs. **DWB, DLC**—Water samples were collected from 47 wells and springs in the Ogallala formation in the Llano Estacado section of the High Plains, Texas and New Mexico. The Ogallala, a fluvial-geologic terrain, is hydrologically and geologically isolated in this region, therefore, the observed radiochemical concentrations are considered as inherent characteristics of the formation in this area. The uranium concentrations ranged from 0.9 to 12 parts per billion (ppb) (median 6.2 ppb), and the radium concentrations ranged from <0.1 to 0.8 micromicrocurie per liter (median 0.1 $\mu\mu\text{Ci/l}$). The uranium concentrations show a tendency to correlate with the gross chemical character of the waters in accordance with the expected chemical behavior of uranium. The departure of the radium-uranium ratios in all samples from radioactive equilibrium value is explained on the basis of carbonate-complexing of uranium and selective adsorption of radium by minerals having a capacity for base exchange. *Subject Headings: 1. Ground water composition 2. Uranium in ground water 3. Radium in ground water 4. Llano Estacado.*—Authors' abstract.

10.3-306

551.579.5:551.525.3

†Komarov, V. D., **Issledovanie vodopronitsaemosti merzloi pochvy.** [Investigation of the water permeability of frozen soil.] *Meteorologiya i Gidrologiya*, No. 2:10-18, Feb. 1957. 3 figs., 2 tables, 25 refs., eq. **DWB, DLC**—The phase dynamics of water within frozen soil is discussed in a brief review of Soviet literature on this subject and the results of experiments on the water permeability of frozen soil are analyzed. The absorption of water by frozen sand is characterized by the usual absorption curve. The dependence of the experimentally determined coefficient of filtration of frozen sand (K_m) upon the soil moisture before freezing can be expressed by the equation

$$K_m = 15e^{-\frac{0.295a}{-0.022}}$$

where a = soil moisture before freezing (in percent of weight of dry soil). The absorption of water by frozen soil is accompanied by its partial freezing since the lower soil layers experience a rise in temperature as a result of the latent heat liberated in freezing of water. Whether frozen soil remains permeable when melt water trickles through its pores or whether it rapidly becomes impermeable depends above all upon the cold reserve of the soil, the amount of its content which melts at negative temperatures and the cross section areas of the free pore before the beginning of melting. The mean temperature of frozen soil can be taken as an index of the total amount of cold and of latent heat of the phasic transformations of bound water. An analysis of spring runoff is presented in relation to the physical properties of frozen soil as they influence permeability. *Subject Headings: 1. Water permeability of frozen soil 2. Frozen soil.*—I.L.D.

10.3-307

551.579.5:551.501

Kusakabe, M. (C.M. Obs., *Fukuoka District*), **On the eye observation of soil moisture.** *Journal of Agricultural Meteorology*, Tokyo, 11(1):3-4, July 1955. 3 figs., 3 refs. In Japanese. English summary p. 4. **DWB**—The author classified the condition of the earth's surface into five types, and the relation between appearance of earth's surface and soil moisture is shown. When soil moisture decreases, cohesion of soil diminishes, generally. Fig. 3 shows the frequency distribution of soil moisture, when the soil lost its cohesion. These relations suggest to us the possibility of roughly-taken eye observation of soil moisture. *Subject Heading: 1. Soil moisture observation.*—Author's abstract.

10.3-308

551.579.5:551.524.4

Onchukov, D. N. (*Moscow Tech. Inst. Food Ind.*), *Sutochnye zakonomernosti perenosy tepla i vlagi v pochve*. [The daily regularities of temperature and moisture transport in the soil.] *Pochvovedenie*, Moscow, No. 5:25-30 May 1956. 2 tables, 6 graphs, 8 refs. German summary in resume section p. 4. **DLC**—The results of field and laboratory investigations on the transport of moisture in the soil are presented and analyzed. Measurements were made daily at the surface and at depths of 5 to 60 cm of the temperature of soil particles, the dry and wet bulb temperature of the air of pores, of the humidity of the soil layers and of the parameters of the air 1 cm above the ground. The amplitude of temperature oscillations decreases with depth more rapidly than the exponential function of Fourier's formula. The difference in temperature between the temperature of the air in the pores and that of the soil particles depends upon the heat penetration. The humidity of the air in pores diminishes gradually in the direction from the evaporation layer to the soil surface. The evaporation zone increases in the depth when the soil is warmed by the sun. At evening and night the temperature of the soil particles is lower than that of the air in the pores, the wet bulb temperature is either equal or greater than that of the air in the pores. Also the movement of water under the influence of the temperature gradient is discussed. *Subject Headings*: 1. Soil moisture gradient 2. Soil-heat transport.—*I.L.D.*

10.3-309

551.579.5

*Philip, J. R. and de Vries, D. A. (*both, C.S.I.R.O., Div. of Plant Ind., Deniliquin N.S.W., Australia*), **Moisture movement in porous materials under temperature gradients**. *American Geophysical Union, Transactions*, 38(2):222-232, April 1957. 3 figs., 2 tables, 36 refs., 24 eqs. **DWB, DLC**—A theory of moisture movement in porous materials under temperature gradients is developed which explains apparently discordant experimental information, including (a) the large value of the apparent vapor transfer, (b) effect of moisture content on net moisture transfer, and (c) the transfer of latent heat by distillation. The previous simple theory of water vapor diffusion in porous media under temperature gradients neglected the interaction of vapor, liquid and solid phases, and the difference between average temperature gradient in the air-filled pores and in the soil as a whole. With these factors taken into account, an (admittedly approximate) analysis is developed, which predicts orders of magnitude and general behavior in satisfactory agreement with the experimental facts. An important implication of the present approach is that experimental methods used to distinguish between liquid and vapor transfer have not done so, since what has been supposed to be vapor transfer has actually been series-parallel flow through liquid "islands" located in a vapor continuum. Equations describing moisture and heat transfer in porous materials under combined moisture temperature gradients are developed. Four moisture-dependent diffusivities arising in this connection are discussed briefly. *Subject Heading*: 1. Soil moisture transfer.—*Authors' abstract.*

10.3-310

551.579.5

Swartzendruber, D. (*Dept. of Agronomy Purdue Univ.*) and Huberty, M. R. (*Dept. of Irrigation and Soils, Univ. of Calif.*), **Use of infiltration equation parameters to evaluate infiltration differences in the field**. *American Geophysical Union, Transactions*, 39(1):84-93, Feb. 1958. 6 figs., 4 tables, 14 refs., 11 eqs. **DWB, DLC**—The infiltration equations $y = At^B$ and $dy/dt = a + b/y$ have appeared in the literature, where y is the quantity of water which will enter a soil when water is applied to the surface, and t is the time. In the present investigation, the constants A , B , a , and b , are considered for their usefulness in characterizing infiltration in field basins on Greenfield loamy sand, a deep soil without profile development. The product parameter AB is compared with a parameter R_T which is simply the average rate over the first two hours of infiltration. The results show AB to be 40% better statistically than R_T . On the other hand, $a + 10b$, which is superior to a alone and b alone, is essentially no better statistically than R_T . *Subject Headings*: 1. Infiltration equations 2. Infiltration rates.—*Authors' abstract.*

10.3-311

551.579.5:551.501

Tarakanov, G. I., **Rol' termicheskogo faktora v pereraspredelenii vlagi v pochve**. [The role of the thermal factor in the re-distribution of moisture in soil.] *Pochvovedenie*, Moscow, No.

9:25-36, Sept. 1955. 6 figs., 2 tables, eq. **DLC**—An experimental study of the phenomenon of evaporation and condensation of moisture within soil layers and the movement of soil moisture in its gaseous phase under the influence of the thermal gradient. With the aid of diagrams, the author describes the experimental apparatus which consists of a container holding soil, two thermostat receivers below and above the container and communicating with it, and a series of devices for regulating and measuring temperature and moisture of the soil in the container, and the temperature and humidity of the air in the pores and in the receivers. Data are presented, indicating that the evaporation and condensation of moisture within soil are accompanied and caused by the circulation of atmospheric moisture within the soil under the influence of vertical temperature gradient in the soil. *Subject Headings*: 1. Soil moisture 2. Soil moisture measurement 3. Heat-soil moisture relationships.—*I.L.D.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

See: **Agroclimatic & water resources, U.S.S.R.**, 10.3-10; **Ice field effects on air temperature** (Wexler), 10.3-54; **Architectural climatology** (Fry, Drew), 10.3-92.

CLIMATE OF PARTICULAR PLACES

See also: **Climate, West Pakistan** (Khan), 10.3-17; **Climate of German North Sea Coast**, 10.3-27; **Climate, Antarctica** (Fricker), 10.3-35; **Climatic data, Mould Bay, N.W.T., Canada**, 10.3-50; **Bibliog. of climate, Angola** (Ferreira), 10.3-67; **Climatic charts, Mexico** (Saltsman), 10.3-70.

10.3-312

551.582.1(83)

†Weischet, Wolfgang, **Ultima Esperanza, Departamento Magallanes/Chile**. [Ultima Esperanza, Department of Magallanes, Chile.] *Die Erde*, Berlin, 88(2):128-138, 1957. 4 figs., photo, 19 refs. **DLC**—This geographical description of one of Chile's southernmost territories, bordering upon Tierra del Fuego, and separated from the rest of Chile by an unsettled forest region some 600 mi long, includes a section on climate (no data on the climate of this area have been published so far), based on records of the Sociedad Esplotadora de Tierra del Fuego. The three climatic features most characteristic of the region are: 1) steadily cool weather (monthly mean temperature range from 1.4 to 11.7°C), 2) prevalence of strong winds (annual average wind—14 km/h) and 3) great differences in precipitation (5000 mm/year in the western part as opposed to 450 in the east) due to a mountain effect. Data on the annual march of precipitation (3 eastern stations) and on annual and diurnal march of temperatures at Punta Arenas (10 yrs) are presented. *Subject Headings*: 1. Climate of Ultima Esperanza, Chile 2. Ultima Esperanza, Chile.—*G.T.*

10.3-313

551.582.2(569.4)

*Ashbel, Dov, **Climate of Jerusalem, Vol. 2**. Jerusalem, Israel, Dept. of Meteorology and Climatology, Hebrew Univ., 1957. 53 p. entirely tables. Index and legends in English and Hebrew.—In Vol. 1 the monthly and annual means and frequencies of the several meteorological elements observed at Jerusalem over a century (1846-1952) were given in extensive tables. Vol. 2 presents the daily means of maximum and minimum temperatures (1931-56); sunshine hours, monthly totals of sunshine (1930-56); pressure (1955-56); hourly mean wind speed, air temperature and relative humidity (1955-56); temperature frequencies for each month 1934-1956; daily global radiation (1954-56); hourly totals of solar radiation (1953-57); normal incidence solar radiation, infrared-yellow solar radiation, cooling power by frigorimeter and katathermometer and daily wind flow (1955-56). (For abstract of Vol. 1, see 5.8-231, Aug. 1954, *MAB*.) *Subject Headings*: 1. Climate of Jerusalem 2. Solar radiation data 3. Jerusalem.—*M.R.*

10.3-314

551.582.2/3(443/444)

*Grisollet, H., **Climatologie de Paris et de la région parisienne**. [Climatology of Paris and of the Parisian region.] *France. Météorologie Nationale, Mémorial*, No. 45, 1958. 78

pages, 8 figs., tables. **DWB**—Climatological study of Paris and of the Parisian region. The author considers the following climatic elements: temperature (period 1873–1952), precipitations (1873–1952), sunshine (1933–1952), fogs (1920–1949), thundery days (1873–1952) and wind (1949–1955). In the tables, five values are given for each of these elements: the mean, the two extreme values with indication of the years during which they occurred and the “quartiles.” At the end of each monthly table mention is made of the average distribution of the days of the month with regard to air temperature and relative humidity. The work contains 12 climatographic monthly tables and 1 annual table with a short climatologic survey for each month of the year. Some climatic charts and a graph, giving the annual variation of the temperature, the sunshine duration and the precipitations, are included in this work. *Subject Headings:* 1. Climate of Paris region 2. Climatic data 3. Paris region, France. —A.V.

CLIMATIC VARIATIONS

See: Pleistocene glaciation, Patagonia (Czajka), 10.3–79.

MICROCLIMATOLOGY

See also: Microclimatic research, Pt. Barrow, Alaska (Mather, Thornthwaite), 10.3–20; Temp. over ice fields (Wexler), 10.3–54; Forest microclimates, Hungary (Wagner), 10.3–89; Thermistors and micromet. research (Czelnai), 10.3–135.

10.3–315

551.584:061.3

Gandin, L. S.; Dubov, A. S. and Solov'ev, V. A., *V Glavnoi geofizicheskoi observatorii im. A. I. Voeikova*. [In the Central Voeikov Geophysical Observatory.] *Meteorologiya i Gidrologiya*, No. 8:70–72, 1957. photo. **DWB, DLC**—Brief summaries of papers delivered at a conference of the Scientific Council of the A. I. VOEIKOV Central Geophysical Observatory. The meeting took place in May 1957 and was devoted to the meteorology of the layer of the atmosphere near the ground. The papers delivered were as follows: Results of an analysis of two series (summer and winter) of investigations on the drifting stations Severnyi Polius (D. L. LAIKHTMAN); Application of the equation of heat balance to bodies of water (M. P. TIMOFEEV); Microclimate and heat balance of deserts and of Pamir (M. V. ZUEV); Structural functions of wind and temperature at the ground layer (A. M. OBUKHOV); Studies on fog formation and dispersal (V. I. NIKANDROV); on instruments for use in the ground layer; regional classification of agricultural crops; determination of mean temperature of the active surface from the heat balance equation, etc. *Subject Headings:* 1. Microclimatology conferences 2. Microclimatological research.—I.L.D.

10.3–316

551.584.4(433)

Geiger, Rudolf (*Munich Univ.*), **Modification of microclimate by vegetation in open country and in hilly country**. Prepared for presentation at the Symposium on Arid Zone Climatology, with special reference to microclimatology in Canberra, Oct. 1956. 5 p. 9 figs., 8 refs. **DWB** (M84.4 G312m)—The general relationship between vegetation and microclimate and the detailed relationships between radiation, temperature, evaporation, dust, etc., and vegetation in open, plain and hilly country are discussed from the point of view of arid zone cultivation. Gradual development of tree or plant cover must occur if good results are to be obtained in hot dry regions. Experiments, using 12 stations on a mountain slope (Grosser Falckenstein 2000–4300 ft above sea level) in Germany, and correlating the microclimatic data with phenological data (some of it from cultivated plants introduced for the specific study), are described and illustrated graphically and pictorially. *Subject Headings:* 1. Slope microclimatology 2. Vegetation influences 3. Grosser Falckenstein, Bavaria.—M.R.

10.3–317

551.584.9(472.2/5)

*Kopan'ev, I. D., **Temperatura i vlazhnost' vozdukh na osushennom bolote**. [Air temperature and humidity over a dry swamp.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:548–551, 1957. 4 tables, 3 refs. **DLC**—A study of the character of the summer temperatures and moisture regime of dried swamps in Estonia. Data are presented on the hourly

air temperature and temperature differences along the vertical (50–150 cm) for the period from June 10, to July 22, 1954 on the temperature of the soil surface, on the mean air temperature on days with little cloudiness, and on the mean hourly absolute humidity for the same period as above. *Subject Headings:* 1. Dry swamp microclimatology 2. Estonia.—*I.L.D.*

BIOCLIMATOLOGY

See: Land and sea breeze effects, Usedom, East Germany (Zenker), 10.3–7.

UPPER AIR CLIMATOLOGY

10.3–318

551.587(498)

Cristodor, E., *Analiza aerologică a lunii ianuarie*. [Aerological analysis for the month of January.] *Meteorologia și Hidrologia*, Bucharest, 2(1):8–16, Jan./March 1957. 4 figs., 4 refs. **DWB**—On the basis of 176 radiosonde ascents at Bucharest average values of the following elements are tabulated and graphically presented for every Jan. from 1950 to 1955: 1) temperature at the surface, 500 and 1000 gpm; 2) characteristics of surface inversions (54 of the soundings revealed such inversions); 3) height of the 0°C isotherm; 4) height, pressure, temp. and humidity at the condensation level; 5) the –20°C isotherm; 6) tropopause characteristics and 7) frequencies of air masses. *Subject Headings:* 1. Aerological studies 2. Bucharest, Romania.—*G.T.*

10.3–319

551.587:551.55(58)

Emm, Z. G., *Aeroklimaticheskaja obrabotka vetra po tipam sinopticheskikh polozhenii*. [Aeroclimatic analysis of wind according to types of synoptic situation.] (In: *Akademiia Nauk Uzbekskoi SSR. Institut Matematiki i Mekhaniki, Meteorologiya i gidrologiya v Uzbekistane*. Tashkent, 1955. p. 219–223. 3 figs., 4 refs., 6 eqs.) **DLC**—If types of synoptic conditions can be established for aeroclimatic characteristics such as wind, the variation of the meteorological elements will be more homogeneous and the mean characteristics will be more significant in analysis of the dynamics of the atmosphere. For Central Asia, the synoptic types have been established. In constructing a map of the prevailing air currents over Central Asia during incursions of cold air, the wind values are averaged according to the phases of the development of a process which is divided into three phases, depending upon the type of process. The phases into which northwesterly and northerly cold incursions into Central Asia are on synoptic charts and the procedures for determining frequency of wind direction, both by means of formulas and a nomogram, are developed. Actual computations are presented and the nomogram is given. *Subject Headings:* 1. Synoptic climatology of wind 2. Wind charts 3. Central Asia.—*I.L.D.*

ENVIRONMENTAL INFLUENCES

See: Forest climatology, Hungary (Wagner), 10.3–89.

SYNOPTIC CLIMATOLOGY

See: Arctic synoptic and dynamic climatology (Hare, Orvig), 10.3–6; Winter weather type frequencies, Great Plains (Calef et al.), 10.3–19; Synoptic climatology of Hungary (Péczy), 10.3–22.

MISCELLANEOUS

COSMIC INFLUENCES

See also: Meteor influences on radio wave scattering (Saxton), 10.3–210.

10.3–320

551.590.21:551.510.535

Eyfrig, Rudolf, A critical discussion about special ionospheric characteristics. *Journal of Atmospheric and Terrestrial Physics*, London, 11(3/4):163–176, 1957. 12 figs., table, 6 refs.,

eqs. **DLC**—A series of examples prove that the present measurements of the characteristic ($M3000$)F2 have an unambiguous relation with change of the solar activity, but only for limited regions on the earth. M values as reported at present by different stations are partly insufficient and even too contradictory to justify a worldwide examination. The importance of accuracy of both height and MUF measurements has been specially stressed, because of the Geophysical Year. Complete results, in view of the geophysical meaning of the relation between ($M3000$)F2 and solar activity, will be published elsewhere. *Subject Heading: 1. Solar activity-F2 layer relationships.*—*Author's abstract.*

10.3-321

551.590.24:551.524:551.542(262.5)

Dmitriev, A. A.; Bonchkovskaia, T. V. and Kalinina, T. A., **K voprosu ob izmenenii meteorologicheskikh elementov vo vremia solnechnogo zatmeniiia.** [Changes in meteorological elements during solar eclipses.] *Akademiia Nauk SSSR. Morskoi Gidrofizicheskii Institut, Trudy*, 7:93-119, 1956. 3 figs., tables, 5 refs., 49 eqs. **DLC**—In an attempt to explain the processes taking place in the atmosphere during solar eclipses, and as an evaluation of possible changes in meteorological elements, the authors present a highly theoretical analysis of temperature and pressure disturbances under conditions similar to those observed during the eclipse of June 30, 1954. The theoretical deductions are compared with results of meteorological observations during the eclipse made by a special expedition organized by the Maritime Hydrophysical Institute for that purpose at two points on the Azov Sea coast. It is shown that both theoretical and experimental data are in accordance with the considerable influence of the eclipse on temperature variations at the earth's surface, and of the lowest air layer. As regards to change in pressure—it appears that experimental data exceed the theoretically computed results. *Subject Headings: 1. Eclipse effects on temperature variations 2. Eclipse effects on pressure variations 3. Azov Sea Coast.*—*A.M.P.*

10.3-322

551.590.24

*Duginov, V. I., **Khod meteorologicheskikh elementov v period solnechnogo zatmeniiia 30 iunia 1954 g. v Kamennoi Step.** [Variations of meteorological elements during the solar eclipse of June 30, 1954 in the Kamennaia Steppe.] *Meteorologiya i Gidrologiya*, No. 7:24-27, July 1956. 2 tables, 2 refs. **DWB, DLC.** Trans. into English available. **DWB** (M 6.9D866me)—Tables containing data on the hourly variation of cloudiness (upper and lower cloudiness and cloud type), hourly variations of solar radiation, effective illumination and radiation balance and hourly values of the meteorological elements at 0.2 and 2.0 m. The meaning of these values is discussed. *Subject Headings: 1. Solar eclipse effects on meteorological elements 2. Kamennaia Steppe.*—*I.L.D.*

VISIBILITY

See also: Global radiation-wind-visibility relationships, Köln, Germany (Band), 10.3-240;
Transmission of light through water vapor (Yamamoto, Sasamori), 10.3-246.

10.3-323

551.591:551.571 551.575.36:551.571

*Appleman, H. (2nd Weather Wing, TSD, APO 57, N. Y.), **A study of the relationship between visibility and temperature-dew point spread.** *American Meteorological Society, Bulletin*, 39(1):31-34, Jan. 4 figs., 2 tables. **DWB, DLC**—Studies carried out at Barksdale AFB, Louisiana, and at Rhein-Main AFB, Frankfurt, Germany, to determine the relationship of visibility to temperature-dew point spread, are reported and the resulting data given in tables and nomograms. The overall fog frequency at Barksdale (534 cases) decreased as the spread increased (100% at 0° spread, and 8% at a 4° spread), but at Rhein-Main (659 cases) more and denser fogs occur with a small dew point spread. *Subject Headings: 1. Fog-dew point spread relationships 2. Visibility-dew point spread relationships 3. Barksdale Air Force Base, La. 4. Rhein-Main Air Force Base, Germany.*—*M.R.*

10.3-324

551.591:551.521

Cunniff, Charles V. (U. S. W. B., Blue Hill Obs., Milton, Mass.), **Relationship of normal incidence radiation to maximum visibility at Blue Hill Observatory.** *Monthly Weather Review*,

Wash., D. C., 85(4):121-123, April 1957. 5 figs., table, 3 refs. **DWB, DLC**—Observations of maximum horizontal visibility, air mass (length of path traversed by sun's rays) and normal incidence radiation at Blue Hill, Mass., for 1949-56 were analyzed to show the seasonal variations and the relationship between radiation and visibility. A series of 12 monthly scatter diagrams, with curves shows that radiation increases (1) with decrease air mass, (2) with increased visibility and (3) from summer to winter. Other seasonal scatter diagrams show that there is greater variability in radiation at low than at high visibilities. Conclusion is that at high visibilities the air has a more uniform water content than at low visibilities. *Subject Headings: 1. Visibility-radiation relationships 2. Blue Hill, Mass.—M.R.*

OPTICAL PHENOMENA

See also: Light scattering functions (Boll et al.), 10.3-26; *Temp. profiles and refractive index* (Elnesr), 10.3-251.

10.3-325

551.593

Schepler, H. C., **Atmospheric optics.** *Society of Motion Picture and Television Engineers, N. Y., Journal*, 67(4):225-227, April 1958. 3 figs. **DLC**—The factors affecting the visibility and photographability of distant objects through the atmosphere are described. The manner in which each factor deteriorates the visual or photographic image is explained in detail. Means are suggested for reducing the effect of these factors to a minimum in the photography of airborne test targets. *Subject Heading: 1. Atmospheric optics.—Author's abstract.*

10.3-326

551.593.1:52:778.38

Aero Service Corporation, Philadelphia, **Compensation methods for earth's curvature and photogrammetric refraction.** Contract AF 33(616)-2567 (Study of the Earth's Curvature and Atmospheric Conditions), Final Technical Report, (1955?). 35 p. 16 figs., tables, 10 refs. Photostat reproduction by U. S. ASTIA, No. AD 71393. **DN-HO** (TA 593 A2 Final)—The corrections needed for deformation due to photogrammetric refraction and earth's curvature at any flying height in aerial survey computations are elaborately worked out and presented in curves and tables. Equipment and methods are illustrated. Standard astronomical refraction data (published by U. S. Dept. of Interior) are used in one of the models for vertical, and oblique photogrammetry at altitudes from 0-20 km. Other methods of computation are also presented for more efficient calculation. *Subject Headings: 1. Astronomical refraction 2. Photogrammetric refraction corrections 3. Aerial photography.—M.R.*

10.3-327

551.593.63

Zamorskii, A. D., **Redkie formy solnechnogo galo.** [Rare forms of solar halo.] *Priroda*, Moscow, 46(10):79-81, Oct. 1957. 3 figs., 2 refs. **DLC**—Two cases of rare forms of solar haloes with large circles and mock suns, one observed in 1956 on an island in the Arabian Sea in June and the other in October near Kremenchug (Poltava Oblast'), are reported by A. A. SHARUTSKIĭ and V. P. TRISHKIN, the two observers. An explanation of the phenomenon's nature is given by ZAMORSKIĭ. *Subject Heading: 1. Halo observations.—A.M.P.*

ELECTRICAL PHENOMENA

See also: Thunderstorm electricity and electrical charge separation (Reynolds et al.), 10.3-12; *Project Skyfire and lightning fires* (Barrows), 10.3-90; *Radio star scintillation* (Hewish), 10.3-201; *Radio blackouts, Arctic* (Nikol'skii), 10.3-203; *Ionospheric electron density distribution* (Pfister, Ulwick), 10.3-205; *Auroral ionization drift measurements, College, Alaska* (Nichols), 10.3-332.

10.3-328

551.594(234.3)

Israël, H.; Doležalek, H. and Fries, G., **The atmospheric electrical climate at four selected stations in the Swiss Alps, Pt. 1, Survey and problems.** Germany. Deutscher Wetterdienst (Aachen Met. Obs.) Contract AF 61(514)-640, Technical Note No. 6, Feb. 1, 1956. 27 p.

11 figs., eqs. DWB (M94 A111t No. 6). Also their: Pt. 2, Some examples for further climatological studies. *Ibid.*, Technical Note No. 13, July 1, 1957. 43 p. 11 figs., 3 tables, refs., eqs. DWB—Pt. 1 offers a primary comprehensive report on the results of synoptic atmospheric electrical investigations obtained at four stations in the Swiss Alps. The basic atmospheric electrical elements as well as meteorological magnitudes of interest have been continuously recorded and observed throughout one year at two high mountain stations and one (later 2) station in lower country. After a discussion of the different aspects and techniques of research applied in modern investigations in the field of atmospheric electricity, an orographic and climatological description of the individual measuring stations is given. The results of atmospheric electrical registrations are discussed with regard to their behavior during the period of investigation. By that, a view of the atmospheric electrical "climate" in the area of the Swiss Alps is developed. As a supplement to the earlier survey, Pt. 2 deals with several climatological peculiarities and individual experiences. *Subject Headings: 1. Atmospheric electrical climate 2. Swiss Alps.—Authors' summaries.*

10.3-329

551.594

Solov'ev, V. A., *Chto takoe elektroklimat*. [What is electrical climate.] *Priroda*, Moscow, 46(6):73-76, June 1957. DLC—The most important elements of the electric climate are: the electric field in the atmosphere, the quantity of aero ions, the electric current, and space charges. All individual elements of the electric condition of the atmosphere are closely interconnected and it is necessary to take their interaction into consideration in order to characterize the electric climate. *Subject Heading: 1. Atmospheric electricity.—A.M.P.*

10.3-330

551.594.11(661)

Salvador, O. and Masson, H., *Le champ électrique atmosphérique à Dakar*. [Atmospheric electric field at Dakar.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A.*, Vienna, 10(2/3):216-223, 1958. 6 figs., 4 refs. German, English and French summaries p. 216. DWB, DLC—The electronic voltmeter used to measure atmospheric electricity is described with the aid of a circuit diagram; it consists of an isolated radioactive collector connected to a terminal of a field electrometer. Measurements were made at Dakar from Jan., 1955 to July, 1956 and the results are presented in graphical form. The electric field ceases to be positive when the trade winds blow; it begins to increase in the early hours of morning when humidity begins to decrease and attains its maximum value between 12 and 14 hrs when the humidity passes through its minimum. A comparison of measurements of atmospheric electricity obtained in Dakar with those in Paris, Buchau, Uppsala and Davos is presented. *Subject Headings: 1. Atmospheric electricity data 2. Voltmeters 3. Dakar, French West Africa.—I.L.D.*

AURORAS

See also: IGY auroral program (Barbier), 10.3-41.

10.3-331

551.594.51:550.385

Alfvén, H., *On the theory of magnetic storms and aurorae*. *Tellus*, Stockholm, 10(1):104-116, Feb. 1958. 5 figs., 25 refs., 8 eqs. DWB, DLC—A) Chapman-Ferraro's theory of magnetic storms is discussed. It is pointed out that the fundamental assumption about a nonmagnetized beam is in conflict with cosmic ray evidence. It is further shown that there is a fundamental objection against any theory of the main phase based on a nonmagnetized beam. B) The objections, which COWLING and CHAPMAN have raised against the electric field theory, are discussed, and the discharge mechanism during a magnetic storm is analyzed. When a magnetized beam enters the earth's magnetic field, it is heated due to the compression. In the case of plasma the earth will act as a "probe" so that it gets a negative charge in relation to the plasma. As a result of ambipolar diffusion to the earth, the ionosphere in the auroral zones will be bombarded by high energy protons and electrons. It is shown that a mechanism of this type is not subject to the objections which have been raised. *Subject Headings: 1. Magnetic storm theories 2. Auroral theories.—Author's abstract.*

10.3-332

551.594.51:551.594.12:551.510.535

Nichols, Benjamin (*Geophys. Inst., Univ. of Alaska, College, Alaska*), **Drift motions of auroral ionization.** *Journal of Atmospheric and Terrestrial Physics*, London, 11(3/4):292-293, 1957. fig., 3 refs. **DLC**—Drifts 400-900 km N. of College, Alaska were measured in VHF ranges (106 and 41.15 Mc/s) from transmitters located 40 km E. of College. Movement of echoes from auroral ionization in the E region are probably due more to the speed of electrons in the disturbance current system than to ionospheric winds. Recent ionization data would indicate a total current of 10^5 A/100 km of lat., in accordance with currents calculated from magnetic observations by SILSBEE and VESTINE (1942) and others. Radar echoes, spread over a range of 100 km are also consistent with electron density, drift velocities and magnetic observations. *Subject Headings:* 1. Auroral ionization drift measurements 2. Auroral ionization of E layer 3. College, Alaska.—*M.R.*

PART II. ANNOTATED BIBLIOGRAPHY OF RECENT LITERATURE ON SOIL MOISTURE

Compiled by: Geza Thuronyi

INTRODUCTION

It has always been the policy of *Meteorological Abstracts and Bibliography* to cover pertinent areas outside the field of meteorology, and several special bibliographies have been published in such peripheral fields as oceanography, geomagnetism, radioastronomy, etc. The present bibliography is another contribution to this peripheral coverage. Its subject is the moisture captured in the soil by capillarity or adhesion (not the free water or the chemically bound constituent water), with emphasis on methods and instruments for its measurement. Our selection is naturally biased toward material of explicit or implicit meteorological interest, but other applications have not been neglected. Since one of the major fields of soil moisture applications is agriculture, an effort has been made to include some agricultural literature dealing with soil moisture. We are also including a sample listing of titles selected from the scores of entries indexed under Soil Moisture in each issue of the *Bibliography of Agriculture*, in order to convey an idea of the type of soil moisture literature to be found in the Department of Agriculture Library (see 10C-138 below).

Most of the material presented in this bibliography has been published during the last 5 years and no attempt has been made to include the earlier basic literature. Moreover it was not found possible to repeat abstracts from earlier issues of *MAB*. Index numbers of these abstracts are listed below, however, and they are also referred to in the SUBJECT OUTLINE. It is hoped that the over 200 references to earlier *MAB* abstracts, some 140 new abstracts, and some 60 unannotated titles (10C-138) will be found to represent a fair sampling of the recent literature on soil moisture.

This bibliography was prepared for and with support from the U. S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

LIST OF ITEMS PREVIOUSLY PUBLISHED IN *MAB* ON SOIL MOISTURE

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10C-1

551.579:631.811.91

Achtnich, Wolfram, *Eine Methode zur Berechnung des Wasserverbrauchs der Pflanzen mit Hilfe klimatologischer Daten*. [A method to calculate the required water for plants considering climatological data.] *Zeitschrift für Pflanzenernährung, Düngung, Bodenkunde*, Weinheim, Germany, 79(2):97-101, 1957. 2 figs., 12 refs. **DLC**—The development of agriculture, particularly in countries where irrigation is necessary, needs a method for calculating the required water amount for plants. The author comments on the formula of BLANEY and CRIDDLE: $U = KF$, where U = water supply of plants; F = amount of climatic factors; K = plant coefficient. K (sorts of cultivation) has been developed. The employment of the formula is explained in an example. *Subject Headings*: 1. Soil moisture requirement 2. Water supply of plants.—A.V.

10C-2

551.525:551.579.5:631.43:631.4451/2

†Baden, W. and Eggelsmann, R., *Über das Bodenklima verschiedener Hochmoorkulturen und sein Einfluss auf den Pflanzenwuchs*. [On the soil climate of several marsh-cultivations and its influence on the growth of plants.] *Zeitschrift für Acker- und Pflanzenbau*, Berlin, 106(2):127-152, July 1958. 21 figs. (including photos), 9 tables, 59 refs. German and English summaries p. 149-150. **DLC**—Soil climate investigations at the Marsh Research Station at Königsmoor, Kr. Harburg, are described for the years 1950/53. These were conducted on a "German high marsh cultivation"; on "Handgekuhlten Hochmoor" (turf rolled away by hand and replaced over a layer of sand);—on a deeply ploughed high marsh, as well as on a sandy heath under otherwise similar environmental conditions. In the introduction, the regional circumstances, the method of research and the known available literature are briefly discussed. The following are the results of the investigations: 1) Soil moisture in the various soils, which were almost free of clay and silt, was quite different, depending on the respective turf or humus content, but followed a parallel course. Because of higher evaporation, fluctuations in soil moisture were greater on moorland soil than on soils mixed with sand. The wilting point was reached sooner on the former soil than on the latter ones. 2) The annual and daily range of soil temperature was considerably more pronounced on sandy soils than on moorland soils. Because of this, the air temperatures near the soil over the sandy cultivations were considerably more equable than over the marsh one, over which there was also a greater hazard from night frost. 3) The more favorable environmental conditions of the sand mixture cultivations showed themselves in visibly speedier plant growth, which is not without importance for a stubble catch crop. *Subject Headings*: 1. Soil moisture 2. Soil temperature 3. Frost penetration in soil 4. Phenological observations.—Authors' abstract.

10C-3

631.6:551.579.5

*Bagrov, M. M., *Rezhim orosheniia i sposoby poliva iarovoi pshenitsy v zone Volgo-Donskogo sudokhodnogo kanala imeni V.I. Lenina*. [Irrigation regime and method of flooding summer wheat in the region of the V.I. Lenin Volga-Don navigable canal.] *Gidrotekhnika i Melioratsiia*, Moscow, No. 1:39-51, 1953. 14 tables. **DLC**—Different methods of irrigation are compared on the basis of the soil moisture regime and the resulting yield, giving extensive experimental data. *Subject Headings*: 1. Irrigation 2. Soil moisture 3. Volga-Don Canal, U.S.S.R.—A.A.

10C-4

551.508.79:551.579.5

Berg, L. G. and Sitnikov, N. V., *Skorostnoe opredelenie vlazhnosti pochv gidridnym metodom*. [Rapid soil moisture determination using the hydride method.] *Pochvovedenie*, Moscow, No. 5:78-80, 1958. 1 fig., 1 table. **DLC**—The hydride gas volumetric method developed by the author makes it possible to determine the content of hygroscopic moisture in soil with a very simple equipment, both under laboratory and field conditions. The method of soil moisture determination without warming makes it possible to measure separately the slightly bound and the more stably bound moisture. Determinations of soil moisture by the drying method agree with those obtained by gas volumetric determinations carried out in a heated bath. The great advantage of the proposed method is its swiftness. The whole operation of mixing the weighed portion of soil with calcium hydride and cooling lasts 20 min. *Subject Headings*: 1. Soil moisture measurement techniques 2. Hydride method of soil moisture measurement.—A.M.P.

10C-5

551.579.5

*Bitiukov, K. K.; Mikhailov, M. N. and Popova, V. Ia., *Nakoplenie i sokhraneniye vlagi v pochve*. [Soil moisture storage and conservation.] 2d revised and enlarged ed. Moscow, Gosud. Izdat. Sel'skokhoziaistvennoy Literatury, 1956. 173 p. 47 figs., 42 tables. **DLC** (S594.B5 1956), First ed. (1953) issued under title *Priemy nakopleniya i sokhraneniya vlagi v pochve*. 118 p. 11 figs., 30 tables. **DLC** (S594.B53)—The purpose of this book is to describe methods of soil moisture conservation for the improvement of water use by plants in steppe, forest-steppe and desert-steppe regions. Climatic (precipitation, dry winds, etc.) and other natural conditions in these different steppe regions and their geographic distribution in the U.S.S.R. are discussed. Techniques of snow, melt-water and flood water retention are described, including special methods of plowing, shelter belts, etc. Data on effects of such measures upon soil moisture and upon crops are included. *Subject Headings*: 1. Soil moisture conservation 2. Ground water storage 3. Water conservation 4. U.S.S.R.—G.T.

10C-6

551.579.5

Blagoveshchenskiy, E. N., *Vodnyi rezhim suglinistykh pochv pri minimal'nom kolechестве osadkov*. [Water regime of loam soils under minimum precipitation.] *Pochvovedenie*, Moscow, No. 2:128-130, 1957. 2 figs. **DLC**—This study on the water regime of loam soils under minimum precipitation was carried out in the driest part of the Turanian Depression, on the left bank of the Amu Darya near the city of Khiva. Graphs showing chronosequences of soil moisture at points relatively close to ground water and of relatively deep ground water are presented. The soil moisture characteristics at the various depths in relation to the ground water are described. *Subject Headings*: 1. Ground water 2. Soil moisture variations 3. Loam soils 4. Khiva, U.S.S.R.—I.L.D.

10C-7

551.579.5:551.573

Blanc, Milton Lyle, *Report on preliminary soil moisture observations at the University of Maryland Tobacco Farm (Agronomy (Crops) Seminar)*. U. S. Weather Bureau, Washington, D. C., April 29, 1957. 13 p. fig., 6 tables, 8 refs. Mimeo. **DWB** (M79.5 U587re)—In anticipation of the main project on irrigation, to be carried out at the University Tobacco Research Farm near Upper Marlboro, Md., a pilot study of soil moisture in a nearby plot was conducted during the summer of 1956. The present report describes and discusses the methods used in the study, and the results obtained, which include physical characteristics of the soil, climatological data accumulated during the pilot project, and soil moisture data. The observed soil moisture loss is compared with computed evapotranspiration. It has been found that the collected data are not sufficient for general application. *Subject Headings*: 1. Soil moisture data 2. Evapotranspiration-soil moisture relationships.—A.M.P.

10C-8

551.579.5:551.508.79

Blanc, Milton L. (*Office of Climatology, U. S. W. B., Wash., D. C.*), *Measuring soil moisture*. U. S. Weather Bureau, *Weekly Weather and Crop Bulletin*, Wash., D. C., 44(18):7-8, May 6, 1957. 8 refs. **DWB**—A concise discussion of soil porosity and bulk density measurements from "cores" or samples (one sample gave 40% total pore space, 7% air-pore space, 33% capillary-pore space, 1.6 gm/cc bulk density, soil moisture 25% at saturation and 21% of dry weight at 60 cm tension). Field capacity wilting point, available capacity, conversion of % to inches, and notes on rise of tables of soil moisture published in the *Weekly Weather and Crop Bulletin* are also discussed. *Subject Headings*: 1. Soil moisture terminology 2. Soil moisture measurement techniques.—M.R.

10C-9

551.579.5:551.585.55

*Bol'shakov, A. F., *Vodnyi rezhim bogarnykh pochv Uzbekistana*. [Water regime of nonirrigated crimson soils in Uzbekistan.] *Akademiia Nauk, SSSR, Pochvennyi Institut, Trudy*, 32:297-349, 1950. 18 figs., 23 tables, 5 refs. **DLC**—A contribution to the soil hydrology and microclima-

tology of semiarid zone. A comprehensive program of observations was carried out during the war in 1942-45 at the Miliutinskaia Agricultural Station in the Samarkand District. Data and isopleths are given for soil and air temperature from -60 to +50 cm (selected days); the annual course of soil temperature is shown up to 300 cm as well as the diurnal course of humidity above and in the soil. Extensive data characterize the movement of moisture in the soil, studied by means of chlorine. The soil moisture reserves decrease from over 300 mm in the spring to about 180 mm in the late summer (layer 0-150 cm). There is practically no rain in the summer. The soil moisture regime is studied separately for fallow and wheat fields. *Subject Headings:* 1. Soil moisture 2. Agricultural meteorology 3. Semiarid regions 4. Samarkand, Uzbek, S.S.R.—A.A.

10C-10

551.508.79:551.579.5

Borisov, Malko and K'nev, Stefan, *Apparat za opredeliane vlazhnostta na pochvi*. [An instrument for determining soil moisture.] *Bulgarska Akademiia na Naukite, Sofia, Izvestiia, Otdelenie za Fiziko-Matematicheski i Tekhnicheski Nauki, Ser. Fizicheska*, 3:119-129, Jan./Dec. 1952. 6 figs., 13 refs. Russian and German summaries p. 128-129. **DLC**—An electric instrument for measuring moisture based on changes of dielectric losses measured by alterations in the grid current in an oscillator is described. This instrument, when equipped with a corresponding electrode, can be used as a simple, convenient and sensitive hygrometer for measuring moisture content in grain, flour and other food products, constructions materials, etc. It can also be used as a soil hygrometer in laboratory and field investigations and is especially convenient for continuous soil moisture measurements, which can be registered automatically. Its full effectiveness as a soil hygrometer must still be tested. *Subject Headings:* 1. Soil moisture instruments 2. Electric hygrometers.—A.M.P.

10C-11

551.579.5:551.573:633

†Brand, Fr. C., *Die Beeinflussung der Wasserbewegung im Lösslehm des Dikopshofes durch Pflanzenbestand und Brache bei verschiedener Bearbeitung*. [Influence of cultivation and mulching on the soil moisture in the Dikopshof limy soil.] *Zeitschrift für Acker- und Pflanzenbau*, Berlin, 106(3):257-290, Aug. 1958. 2 graphs., 3 photos, 14 tables, 133 refs. **DLC**—From Oct. 1955, until Oct. 1956, continuous water content determinations were carried out at Dikopshof, in order to investigate the influence of cultivation and mulching on the soil moisture of a lucerne and a fallow area. In addition, at a percolating point where it was possible to make observations at various depths, investigations were also made into the downward movement of the rain water, with the co-related nutrient redistribution. Rainwater storage capacity (0-100 cms) of the Dikopshof light loam amounted to about 330 mm, but the "dead water" amounted to about 100 mm. It was found: that a straw mulch about 15 cm thick largely protected the ground from the force of atmospheric evaporation; that the evaporation from the fallow soil, in spite of regular hoeing, was only slightly decreased, compared with the uncultivated soil; that under lucerne, the quantity of ground water was always less at all depths than under fallow, except at 40 cm where the root network produces conducting paths which help the infiltration of the rain water. These and several other results are clearly explained in this interesting work. On the basis of the quantities found in 1 liter of ground water, it was also established: that lime is found in the ground water at all depths in similar amounts under both fallow and lucerne; that the highest nitrogen values were found at a depth of 40 cm; that the potash content decreased with increasing wetness throughout the soil; and that there is little movement of phosphoric acid. *Subject Headings:* 1. Soil moisture movement 2. Evaporation 3. Percolation 4. Plant cover effects on soil moisture 5. Dikopshof, Germany.—Author's abstract.

10C-12

551.508.79:551.579.5

Breshchkovskii, P. M., *Uskorennoe opredelenie vlazhnosti pochvy metodom pressa*. [Rapid determination of soil moisture with a press.] *Pochvovedenie*, Moscow, No. 8, 79-85, 1957. 3 figs., 3 tables, 13 refs., 3 eqs. **DWB, DLC**—Various methods employed to measure rapidly the moisture content of soil are described briefly, and a description of the pressing method for rapid moisture determination not requiring great accuracy is given. This method is based chiefly upon determining maximum molecular moisture capacity of A. F. LEBEDEV, by means of which a large amount of data of maximum molecular water capacity is easily handled and it is shown that maximum molecular capacity varies slightly during the vegetation period and can be determined by a single measurement at the beginning of the season; there is no need to construct calibration curves for the entire range of moisture of each soil layer; and a result can be obtained in several minutes. This method requires a hydraulic press. The procedure for "moist" pressing, including two variations and that of dry pressing, is described. To a weight of soil a_1 (not less than 10g), having the moisture sought W , is added approximately the same amount of water h as that in determining maximum molecular capacity. A nomogram for determining h is presented; it is based upon the formula

$$h = \frac{a_1 W_0 \times W_0}{100 + W_0};$$

where W_0 —given limit of soil moisture; W_o —oriented value of moisture sought, determined approximately; and a_1 —weight of soil. A table giving the coefficients for determining h ; the formula for determining

$$W \left(\frac{W = a_1 \times a_2 (100 + m)}{(a_1 + h) a_2} \right) - 100,$$

and a table giving a comparison of moisture with the press method, and with drying method, and the second variant of the moist method, are presented. *Subject Heading: 1. Soil moisture measurement techniques.—I.L.D.*

10C-13

551.573:551.579.5

Budagovskii, A. I., *Zavisimost' isparenniia ot vlazhnosti pochvy*. [Dependence of evaporation on soil moisture.] (In: *Akademiia Nauk SSSR. Institut Geografii, Sukhovei ikh proiskhozhdenie i bor'ba s nimi*. Moscow, 1957. p. 189-198. 4 figs., 8 refs., 9 eqs.) **DLC** (QC940.R9A6)—A highly theoretical paper in which the author attempts to explain the character and essence of the dependence of evaporation on soil moisture. *Subject Heading: 1. Evaporation-soil moisture relationships.—A.M.P.*

10C-14

551.579.5

Buettner, Konrad J. K. (*Univ. of Wash.*), *Sorption by the earth surface and a new classification of kata-hydrometeoric processes*. *Journal of Meteorology*, Boston, 15(2):155-163, April 1958. 5 figs., table, 22 refs., 14 eqs. **DWB, DLC**—It is proposed to call all processes, which bring water of any phase to the surface, *kata-hydrometeoric processes*. Their classification includes, e.g., intercepted precipitation, dew, and at least five forms of sorption. Special emphasis is then given to some generally neglected sorptive processes. Sorptive water intake can be calculated by using HOFMANN's dew formulas if the relative humidity of the surface is supposed to be less than 100%. Soil, plants and water solutions have known sorptive qualities; the most important process in practice is adsorption by dry clay. Field tests in India, Ohio, Nebraska and Texas show strong soil sorption, especially on the late afternoons of sunny days. This sorption seems also responsible for fog prevention along the Gulf Coast on summer nights. *Subject Headings: 1. Kata-hydrometeoric processes 2. Adsorption.—Author's abstract.*

10C-15

551.579.5

Burckhardt, Hans and Rettig, Helmut, *Zum jahreszeitlichen Gang des Bodenwassergehaltes*. [The seasonal regime of soil moisture content.] *Meteorologische Rundschau*, Berlin, 10(6):179-181, Nov./Dec. 1957. 5 tables, ref. **DWB, DLC**—The annual variation of soil moisture content is analyzed on the basis of four years of observations carried out on sandy clay soil at Neustadt. Soil samples were taken at depths from 10 cm to 1 m and soil moisture content was determined by weighing before and after desiccation. Nitzsch cylinders were used to convert weight percentages into volume percentages. The soil moisture content is at maximum in winter, begins to decline in spring, reaches a minimum in May and shows a secondary maximum in June and July. Neither surface evaporation or rainfall fully explains this phenomenon. An analysis of the water transport indicates that the annual variation of soil moisture is influenced by changes in the temperature gradient in the soil. The large discontinuities in the seasonal regime of vertical water transport at the beginning of the transition seasons correspond to the time intervals of the temperature regime in which the sign of the temperature gradient alters. *Subject Headings: 1. Soil moisture seasonal variations 2. Neustadt, Germany.—I.L.D.*

10C-16

551.508.79:551.579.5

Burgy, R. H. and Luthin, J. N. (*Dept. Irrigation, Univ. Calif. at Davis*), *A test of the single- and double-ring types of infiltrometers*. *American Geophysical Union, Transactions*, 37(2):189-192, April 1956. 3 figs., table, 6 refs. Discussion by Walter T. Wilson, p. 191-192. **DWB, DLC**—The results of field experiments with ring-type infiltrometers are reported. Infiltration rates obtained with the rings were compared to the infiltration rates obtained by flooding the entire area to determine the number of ring measurements required to characterize the infiltration rate of the area. It was found, on a uniform soil profile having no layers restricting the downward movement of water, that six infiltrometers gave an average figure that was within 30% of the true mean. The single-ring infiltrometers were compared with the double-ring infiltrometers. There was no significant difference in the results obtained with the two types of infiltrometers on a uniform soil under the conditions of the tests. *Subject Headings: 1. Soil moisture instruments 2. Infiltrometers.—Authors' abstract.*

10C-17

551.525.4:551.579.5

Chernikov, F. S., *Temperaturnyi rezhim svetlo-kashtanovoi suglinistoï pochvy Ergenei v pole i pod lesnoi polosoi*. [Temperature conditions of a light-chestnut loamy soil of the Ergenei area in a field and in a forest belt.] *Pochvovedenie*, Moscow, No. 4:67-73, 1958. 2 figs., 8 refs. **DLC**—An investigation of the variations of the temperature regime of soil under forest strips of about 20 m width and in fields is presented in order to determine the relationship between soil temperature gradient and the movement of water vapor, and the need for supplementary provision of water to woody plants in forest plantings for protecting fields. Soil temperatures at depths of 0.5 to 4 m were measured during 1951-54 in the Zavetinsk section of experimental forests, situated on the western slope of the Ergenei (47°17' north lat. and 43°53' east long.). The climate of this area is described and thermal isopleths of the soil in the field and in the experimental forest are presented. In the case of shelter belt forest plantings on light chestnut soils of Ergenei, the tree growth raises the soil temperature in winter and reduces it in summer. The most marked temperature change is in the upper half meter soil layer by day in June, July and August, when the difference between the temperature in the field and forest strip reaches 20°C. In the deeper soil layers this difference drops to 4-1°C. The influence of 20 m forest strips upon temperatures extends below a four m depth. By influencing the soil temperature, forest strips reduce the energy of movement of moisture in the vapor state. The change in the temperature regime of the soil under a tree canopy cannot increase the amount of moisture reaching the root zone of forest strips. The single positive effect of the summer cooling action of the tree canopy is to reduce physical evaporation so that 20 mm of soil moisture per season can be saved. *Subject Headings*: 1. Soil temperature-moisture relationships 2. Shelterbelt effects on soil temperature 3. Soil moisture conservation.—*I.L.D.*

10C-18

551.573:551.579.5

†Covey, Winton Guy, Jr., *Testing a hypothesis concerning the quantitative dependence of evapotranspiration on availability of moisture*. Jan. 1959. Thesis (Ms.).—Texas Agricultural and Mechanical College. 58 p. 7 figs., 7 tables, 29 refs., 86 eqs. Typescript.—In an extension of the model of PENMAN and SCHOFIELD (1951, 1953) along lines suggested by BUSINGER (1955), a reasonable hypothesis concerning surface moistness is advanced, namely, that when evapotranspiration is occurring, the rate of latent heat flux is proportional to the difference between saturation vapor pressure at surface temperature and surface vapor pressure, the constant of proportionality being a surface moistness parameter which varies only slowly in the absence of drastic changes in the surface (such as rain, mowing, plowing, etc.). This hypothesis has been set forth before by COVEY and MERRYMAN (1957). Although it is not original with this study, it is not adequately explained in the scientific literature and is therefore discussed in some detail. The surface moistness hypothesis is then tested against an extensive series of observations made at O'Neill, Nebr., in August and September 1953. *Subject Headings*: 1. Evapotranspiration-soil moisture relationships 2. Soil surface moisture.—*From author's introduction.*

10C-19

551.508.79:551.510.7

Danilin, Aleksei Ivanovich, *Primenenie iadernykh izluchenii v gidrometeorologii*. [Application of nuclear radiation in hydrometeorology.] Leningrad, Gidrometeoizdat, 1957. 67 p. 31 figs., 5 tables. **DLC** (QC915.D3)—A technical pamphlet explaining the nature of radioactive isotopes or tracer sources, their measurement and use in measuring soil moisture, evaporation, water content of snow, water table, organic matter in bogs, wind speed and movement, content of grains or crops, movement of substance in soil and other uses in meteorology. Equipment is illustrated by numerous wiring diagrams, schematic drawings and photographs, and theory is outlined wherever pertinent. Soil moisture can be measured with gamma radiation or neutrons. Both methods are treated in detail. *Subject Headings*: 1. Radioactive tracers in meteorology 2. Radioactive moisture measurement 3. Soil moisture measurement with radioactive isotopes 4. Radioactive snow gages 5. Radioactive anemometers.—*M.R.*

10C-20

551.524:551.579.5

Daubenmire, R. (State College of Wash.), *Influence of temperature upon soil moisture constants and its possible ecologic significance*. *Ecology*, Durham, N. Carolina, 38(2):320-324, April 1957. fig., 2 tables, 16 refs. **DWB**—At high altitudes, not only are the summers shorter and the rate of water use reduced but there is increased storage of water in the root horizon equal to about 12 mm of rainfall or the normal rainfall of one of the warmest months. This water is not subject to interception, percolation or direct evaporation loss. These factors, plus a usually higher rainfall (up to a certain altitude) account for the survival and growth of forests at high altitudes in the dry summers of the Northern Rockies and for the rhythmic diurnal variation of streamflow based on transpiration. Explanation of the extra storage is based on fact that soil holds more water and delivers less to plants at low temperatures than at high. Data from experiments on soil moisture at 28°C and 1.5°C in 4 kinds of soils show difference due to chilling of 0.2% to 1.39% of moisture

sand to humus). *Subject Headings*: 1. Temperature effect on soil moisture 2. Altitude effects on soil moisture 3. Northern Rockies.—M.R.

10C-21

551.577.38:551.586:63(57)

*†Denisov, P. S., *Bor'ba s zasukhoi v Zaural'e i Sibiri*. [Antidrought measures in the Trans-Urals and Siberia.] Moscow, Akademiia Nauk, 1954. 75 p. 14 figs. (mostly photos), 17 tables, 2 refs. DWB (626.8 D396bo)—A popular (10,000 copies) pamphlet reporting the results of 20 yrs of research on moisture conservation in the Trans-Ural and Siberian agricultural regions. Experimental measurements of snow depth, soil moisture, evaporation, etc. under different crops and soil cover conditions are given. Effectiveness of trenching, of various types of ploughing, of fertilizing and irrigation methods is systematically described and illustrated with data and photographs. *Subject Headings*: 1. Drought amelioration 2. Snow retention 3. Agrometeorology 4. Siberia.—M.R.

10C-22

551.508.26:551.525.4:551.579.5

de Vries, D. A. and Peck, A. J., (both, Div. of Plant Industry, C.S.I.R.O., Deniliquin, N.S.W.), *On the cylindrical probe method of measuring thermal conductivity with special reference to soils*, Pt. 2, Analysis of moisture effects. *Australian Journal of Physics*, Melbourne, 11(3):409-423, Sept. 1958. 4 figs., 9 refs., 32 eqs. DLC. Pt. 1, *Ibid.*, 11:255-71, 1958.—Thermal conductivity measurements in unsaturated moist porous media are complicated by the action of gravity on the moisture and by moisture movement caused by temperature gradients. The effects of these factors are discussed for the cylindrical probe method. A theoretical analysis shows that temperature gradients give rise to a decrease of moisture content in the vicinity of the probe and a (much smaller) increase at greater radial distances from the probe axis. It is shown how these moisture changes depend on the physical properties of the medium, the probe radius, and the time of heating. The magnitude of the decrease of moisture content at the probe surface is approximately inversely proportional to the probe radius; it increases with increasing time and temperature. In our experiments the region of reduced moisture content has a thickness of the order of the probe radius (0.05 cm). The absolute change in moisture content and the influence on the measured value of the conductivity are small at temperatures below about 40°C. Gravity causes a decrease of moisture content with height in a manner determined by the relation between moisture content and water pressure. In probe experiments the effect of this variation of moisture content in the vertical direction is negligible at water pressures below about -100 cm (using atmospheric pressure as a datum). Some experimental results are presented and analysed. The importance of the cooling branch in detecting the influence of moisture movement is illustrated. *Subject Headings*: 1. Soil thermal conductivity measurement 2. Soil moisture movement.—Author's abstract.

10C-23

551.579.5:551.525.4

de Vries, D. A., *Simultaneous transfer of heat and moisture in porous media*. *American Geophysical Union, Transactions*, 39(5):909-916, Oct. 1958. 5 figs., 16 refs., 26 eqs. DWB, DLC—Simultaneous differential equations for the transfer of heat and moisture in porous media under the combined influence of gravity and gradients of temperature and moisture content are developed. These equations are a generalization of those derived by PHILIP and DE VRIES (1957). In particular consistent distinction is made between changes of moisture content in the liquid and the vapor phase. The interaction between heat and moisture transfer in steady state heat conduction is discussed in detail using numerical values for two soils, a clay loam and medium sand. The behavior is found to be dependent on the boundary conditions for moisture transfer, on the direction of the temperature gradient and on the ratio of two moisture diffusivities entering in the analysis. *Subject Headings*: 1. Soil moisture movement 2. Heat transfer in soil. Author's abstract.

10C-24

551.509.612:551.584:551.579.5:631.548

*Diem, M. and Trappenberg, R., *Die Beeinflussung des Mikroklimas und der Bodenstruktur durch künstliche Beregnung*. [Modification of microclimate and soil structure by sprinkling.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, Vienna, 8(3/4):382-406, 1957. 17 figs., 4 tables, 25 refs. DLC—The authors develop a method for measuring continuously the amount of moving water in soil. It is based upon a method developed by T. GILBERT (see 7.3-189, March 1956, MAB) for measuring water content from moving air volume involving a differential equation relating pressure amplitude, depth and pore radius, namely

$$\frac{d(r^2)}{dz} + r^2 \frac{\frac{1}{2}(\Delta p)''z + (\Delta p)'}{(\Delta p)'z + (\Delta p)} + \frac{k(\Delta p)}{(\Delta p)z + (\Delta p)} = 0;$$

$$k = \frac{4 \cdot \mu \cdot c}{p_0}$$

These theoretical assumptions are clarified and the equation is integrated and simplified so that a simplified arithmetical computation is rendered possible. The determination of moisture content was made with a C-M apparatus, the pressure chamber for producing artificial pressure waves in the soil, together with the manometer, and the mathematical instruments, namely the derivimeter and integrimeter, for evaluating the equations are described. The use of this method and the results of its application in the Schlossböckelheim vineyards are presented. Measurements of the microclimate conditions, including soil temperature, vapor pressure and soil water during sprinkling and nonsprinkling conditions are presented in graphs and tables. *Subject Headings:* 1. Sprinklings. 2. Microclimatic control 3. Soil moisture instruments 4. Soil structure.—I.L.D.

10C-25

551.579.5(497.2)

*Dilkov, D., *Vürkhu vodniia balans na tipichniia chernozem*. [Water balance of typical chernozem.] *Khidrologiia i Meteorologiia*, Sofia, No. 2:35-44, 1957. 4 figs., 4 tables, 9 refs., eq. Russian and English summaries p. 43-44. **DLC** (Slavic)—Monthly data significant for the soil moisture balance (precipitation, atmospheric temperature, and atmospheric soil moisture deficit) are tabulated for Kneza (1954, 1955 and 1956). Soil moisture data are presented for different covers, such as wheat, corn, cotton, alfalfa, sunflower, sugar beet and mixed feed. *Subject Headings:* 1. Soil moisture balance in chernozem 2. Kneza, Bulgaria.—G.T.

10C-26

551.584.4:633

Eger, G., *Beiträge zur Kenntnis des Mikroklimas der Mähwiesen und der osmotischen Werte einiger Wiesenpflanzen*. [Contribution on the microclimate of hay meadows and osmotic values of some grasses.] *Zeitschrift für Acker- und Pflanzenbau*, Berlin, 106(3):337-358, Aug. 1958. 4 figs., 4 tables, 30 refs. English and German summary on p. 354-357. **DLC**—Investigations were carried out on hay meadows in the Leine River Valley south of Göttingen at three sites. In terms of microclimate, soil and air temperatures were measured, as well as evaporation by a Piche evaporimeter. For the top grasses, evaporation is considerable throughout the year. In the case of plants near the ground, evaporation after mowing is very high, but very slight at the period of tallest growth. For several investigated species, the osmotic values were followed up for 2½ yrs, and for whole shoots. All of the species reacted to increasing dryness in spring with a rise in osmotic value which dropped on irrigation. Daily graphs for osmotic values at different soil moistness, for different species and for different stages of development, are given. The course of the daily graphs cannot always be satisfactorily explained. *Subject Headings:* 1. Meadow microclimatology 2. Osmotic values of grasses.—A.V.

10C-27

551.579.5:63

*Egerszegi, Sándor, *Az aljtrágyázás rendszerének agrometeorológiai vonatkozásai*. [Agrometeorological aspects of subsoil fertilizing.] *Időjárás*, 57(3):145-159, May/June 1953. 6 figs., 11 tables. Discussion p. 157-159. Russian and French summaries p. 145. **DLC**—Microclimatic and phenological data obtained in a field treated with a method developed by the author are presented. The method is aimed at improving the moisture storage of sandy soils. Soil moisture data and crop yield appear to indicate that treatment with several layers of compost or dung have a favorable effect on the water balance of sandy soils. *Subject Headings:* 1. Soil moisture 2. Water conservation 3. Crop yield.—G.T.

10C-28

551.579.5

Ekström, Gunnar (*State Geologist, Geol. Surv. of Sweden, Stockholm*), *Infiltration in relation to permeability in Swedish soils*. *International Union of Geodesy and Geophysics. Association of Scientific Hydrology*, Oslo, 1948, [Transactions], v. 3:20-24, [1950?]. refs. **DWB**—Ground water resources available for water supply can be roughly computed from rainfall but, in addition, numerous topographical and soil factors have to be taken into account. One author reviews Swedish research on this subject. *Subject Headings:* 1. Ground water supply 2. Infiltration 3. Sweden.—A.A.

10C-29

625.7:631.4:551.579.5

Fedorovskii, N. N., *Usloviia proezhaemosti gruntovykh dorog SSSR*. *Chast' 1, Obshchaia*. [Trafficability of dirt roads in the U.S.S.R. Pt. 1, General considerations.] *Institut zur Erforschung der UD SSR, Munich, Issledovaniia i Materialy*, [Ser. 1?], No. 16, 1954. 168 p. bibliog. p. 159-162. German, French and English summaries p. 163-168. **DLC**—A study of factors affecting the trafficability of dirt roads in the U.S.S.R., especially in the peculiar conditions of spring and fall periods of rain, snowfall, melting of snow and freezing of the ground is presented. Ch. 3-5 deal with the influence of hydrological, hydrogeological and geobotanical conditions, the significance of the quantity and intensity of precipitation and the effect of other meteorological factors as: ai-

temperature, evaporation from the earth surface, speed and direction of winds and relative humidity.
 Subject Headings: 1. Soil trafficability 2. Highways 3. U.S.S.R.—A.M.P.

10C-30

551.509.329:551.579.5

*Fedoseev, A. P., Ispol'zovanie pokazatelia glubiny promachivaniia pochvy vesnoi v kachestve prognosticheskogo priznaka. [Use of an indicator of soil saturation depth in spring as a forecasting characteristic.] *Meteorologiya i Gidrologiya*, Leningrad, No. 3:40-44, March 1957. 2 figs., 4 tables, 15 refs. DWB, DLC—The author examines the value of the depth to which soil is saturated with water as an indirect indicator of soil moisture reserves. It is shown with the aid of actual data that the depth of soil saturation satisfactorily reflects the available soil moisture; that the depth of soil saturation during spring is suitable for estimating the expected yield of farm crops and of natural and sown fodder grass in the arid regions; that in an individual year only the quality of the yields can be predicted and that the use of depth of soil saturation is limited to natural zones with insufficient moisture where the principal soil moisture reserves are formed during the fall-winter-spring months when summer rainfall is infrequent. Subject Headings: 1. Soil saturation depth 2. Water use by plants 3. Soil moisture forecasting 4. Crop yield forecasting.—I.L.D.

10C-31

551.525:551.579.5

Filippova, A. K., Vodopronitsaemost' merzloi lesnoi podstilki. [Water permeability of a frozen forest floor.] *Leningrad. Gosudarstvennyi Gidrologicheskiy Institut, Trudy*, No. 54:119-125, 1956. 2 tables, 15 refs. DLC—A detailed study of the problem carried out by the author in forests and forest belts of the Institute of Agriculture in the Kamennaya Steppe and of the Mariupol Forest Reclamation Experimental Station at Veliko-Anadol', in 1950-1952, showed that water permeability of a frozen forest floor is in direct dependence on its moisture content and the extent of its frozenness; slightly frozen forest floor with a large quantity of free pores is as permeable as an unfrozen one; hard frozen forest floor with a small quantity of free pores is only slightly permeable. Subject Headings: 1. Permeability of frozen soil 2. Soil moisture-permeability relationships 3. Kamennaya Steppe 4. Veliko-Anadol', U.S.S.R.—A.M.P.

10C-32

551.508.79:551.579.5

Franzini, Joseph B., Permeameter wall effect. *American Geophysical Union, Transactions*, 66(6):735-737, Dec. 1956. 2 figs., 3 tables, 7 refs., 4 eqs. DWB, DLC—If the resistance to flow through a granular medium is to be measured in the laboratory with a permeameter, care must be exercised in interpreting the results so as to account for wall effect. A cursory analysis presented in this paper indicates that, in general, the ratio of permeameter diameter to mean particle diameter should exceed about 40 to eliminate any sizeable effect of the container wall. For ratios less than 40, the Reynolds number of the flow has great influence on wall effect. Subject Headings: 1. Permeameters 2. Percolation.—Author's abstract.

10C-33

551.508.7:551.579.5

Friedrich, W., Lysimetermessungen und andere gewässerkundliche Verfahren zur Ermittlung der Grundwassererneuerung. [Lysimeter measurement and other hydrological methods for determining ground water supply.] *Deutsche Geologische Gesellschaft, Stuttgart, Zeitschrift*, 106(1):1-48, Dec. 1955. 4 figs., 4 refs. DLC, DGS—Basic principles of lysimeter measurement for determining amounts of ground water storage and runoff, and effects of plant cover, are discussed with particular attention to preliminary results of measurements made at Dortmund, Germany (1952-53) and Castricum, Netherlands (1942-47 and 1950-51). In Germany there is a tendency to forego large and expensive weighing lysimeters and install larger numbers of smaller (non-weighing) units in a variety of soils and plant cover. Subject Headings: 1. Lysimetry 2. Dortmund, Germany 3. Castricum, Netherlands.—G.T.

10C-34

551.584.3:631.544

Fuss, Franz, Veränderungen des Bodenklimas durch Boden-Bedeckung bei ausdauernden Kulturen. [Changing the soil climate by mulching during prolonged cultivation.] *Angewandte Meteorologie*, 3(3):74-76, April 1958. 4 refs. DLC—The relationship between soil fertility and the aeration of the soil, the need for providing sufficient oxygen, moisture, and an even temperature of soil in order to maintain optimum conditions for soil life are discussed. The effects of dead organic matter upon the soil climate, in particular upon variations in thermal and water balance, are considered on the basis of experiments carried out at Dresden-Pillnitz during 1952-1954. The influence of a cover of 1.5 kg of dry rope straw per square meter upon soil temperature and soil moisture was determined with the aid of 12 plots each 12.5×7.5 m; also the most efficient quantity of cover was investigated by varying the weight from 0.5 to 10 kg/m². The results show that covering the soil with loose dead organic matter reduces seasonal extremes of temperature and heat extremes between day and night, and that it protects the soil supersaturation of the upper soil layer

and excessive drying out. A cover of 1.5 to 2.5 kg per square meter was most efficient in the thermal aspect. Various numerical values are given in the text. *Subject Headings:* 1. Mulching 2. Soil microclimates.—I.L.D.

10C-35

551.511:551.579:63

Gerasimov, I. P. et al., *Teplovoi i vodnyi rezhim zemnoi poverkhnosti, ego rol' v dinamike prirodnykh protsessov, geograficheskie razlichia i metody preobrazovaniia dlia prakticheskikh tselei.* [The thermal and hydrological regime of the earth's surface, its role in the dynamics of natural processes, and geographical differentiation and methods of amelioration for practical purposes.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 4:47-59, 1956. DWB—The exchange of matter and energy on the earth's surface and the geographical modifications of this process is the basis of all physical, geographic and associated biological phenomena. The heat and moisture exchange of any natural zone, investigated by the methods of heat and moisture balance, are determining factors in agriculture. The authors present a comprehensive and critical survey of the present situation of studies on the heat and moisture balance of geographic zones, particularly in the U.S.S.R. The principal directions in further investigations of this problem, including general-theoretical investigations, physical geographic investigations (agroclimatic and hydrologic foundations of a nationally regionalized and specialized agriculture); drought prevention and erosion prevention by transforming the heat-moisture balance of agricultural regions; the role of snow cover in the heat-moisture regime of the earth's surface and new techniques for using snow in the national economy, the water and heat regimes of irrigated lands and methods of regulating them; water and heat regimes of drained lands and heat amelioration of seasonally frozen soils, permanently frozen mountain rocks, and new sources of water in arid and desert regions are presented. *Subject Headings:* 1. Heat and moisture balance 2. Hydrologic regime 3. Agricultural meteorology.—I.L.D.

10C-36

551.586:63:551.579.5 (64)

*Grillot, Georges and Bryssine, Georges, *Contribution à l'étude de l'humidité des sols du Maroc.* [Contribution to the study of the humidity of the soils of Morocco.] *Morocco. Service de la Recherche Agronomique et de l'Expérimentation Agricole, Les Cahiers de la Recherche Agronomique*, No. 2:71-92, 1949. graphs (fold.), bibliog. p. 92. DWB—Observations of meteorological elements including soil moisture in various crops at Tirs and Hamri in Morocco (1944-6) are shown on composite charts, and data for R'mil compared in tables with those for Tirs and Hamri. General notes on the climate, soil and agricultural operations in Morocco are included. The year 1945 was very dry—no precipitation occurring between Jan. and Oct. However, the ground was saturated in Dec. 1944. Differences in percolations and retained moisture under 3 kinds of crops are analyzed. *Subject Headings:* 1. Soil moisture data 2. Weather and crops 3. Morocco.—M.R.

10C-37

551.573:551.579.5

Gulidova, I. B. and Afanas'eva, E. A., *Vliianie vlazhnosti pochvy na intensivnost' transpiratsii drevesnykh i kustarnikovykh porod.* [Influence of soil moisture on transpiration intensity by trees and bush species.] *Pochvovedenie*, Moscow, No. 8:46-53, 1957. fig. 2 tables, 10 refs. DWB—DLC—The relationship between transpiration and soil moisture was investigated in the summers of 1952 and 1953 in an artificial forest, planted some 50 yrs ago in the Balashov Oblast, in the subzone of the southern black soil. Soil moisture was measured monthly from the time of disappearance of snow to Oct. at every 10 cm to a depth of 4-5 m. Transpiration was measured from oak, birch, ash, honeysuckle in plantings of the woody shade type, woody shrub type and open woody type. In the southern black soil zone, the principal factor determining intensity of transpiration is the water content of the soil. Its dependence upon air temperature and light is observed only if the soil moisture is easily or moderately accessible to the plants. When the soil moisture content of the root zone drops below 70% of saturation moisture, the intensity of transpiration drops sharply, the latter remains more or less constant if the soil moisture is accessible with difficulty. The vegetation period of woody or shrub species is divided into two parts, the first—when the moderately accessible moisture from the autumn-winter-spring reserves in the root zone of the soil remains constant and the plant transpires intensely; second—when only moisture accessible to the plant with difficulty is present in the soil and the intensity of transpiration is retarded. The regular moistening of the upper soil layer by rains provides normal water supply for trees and shrubs and their intense transpiration even when the soil is strongly dried. Differences of the woody and shrub species, with regard to intensity of transpiration, is most marked in the presence of easily and moderately accessible water in the soil and high atmospheric temperatures. *Subject Headings:* 1. Evapotranspiration-soil moisture relationships 2. Balashov Oblast, U.S.S.R.—I.L.D.

10C-38

551.508.79:551.579.5

Hacia, Henry, *The measurement of soil moisture tension.* *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(2):295-299, 1954. 2 figs., 2 tables, 12 refs. DWB—

Measurements by means of tensiometers are outlined, which give only relative values and are unreliable above 750 mb tension. The calibration is discussed and a record of soil moisture tension at O'Neill, Nebr. is shown. *Subject Headings:* 1. Soil moisture measurement techniques 2. Tensiometers 3. O'Neill, Nebraska.—A.A.

10C-39

551.508.79:551.579.5

Haise, Howard R. (*U. S. Agricultural Research Service, Soil and Water Conservation Research Branch*), **How to measure the moisture in the soil.** *U. S. Dept. of Agriculture, Water: the Yearbook of Agriculture*, 1955:362-371, pub. 1955. figs. DA, DWB—Soil moisture measurements by gravimetric methods (samples or cores, and porous blocks), by measuring moisture tension (tensiometers); electrical or resistance methods (conductance, capacitance and dielectric), thermal, nuclear (neutron scattering); and infiltration resistance methods are reviewed in some detail. Limitations of each method as well as advantages are cited; calibration is necessary for all types. The Coleman Fiberglass, and the Bouyoucos resistance instruments are two convenient types available for general use. The vacuum gage tensiometer is used successfully by commercial growers for irrigation control. Costs are mentioned. *Subject Heading:* 1. Soil moisture instruments.—M.R.

10C-40

551.579.5:631.43:532.6

Hall, Warren A. (*Dept. Irrigation, Univ. Calif. at Davis*), **An analytical derivation of the Darcy equation.** *American Geophysical Union, Transactions*, 37(2):185-188, April 1956. 4 figs., 3 refs., 20 eqs. DWB, DLC—The Darcy equation is derived in general form for non-isotropic porous media from NEWTON's basic laws of motion and viscosity. The necessary and sufficient additional postulates are: (1) inertia forces of the system are negligible, (2) the liquid films are continuous, and (3) that a volume element of the fluid-porous medium system can be selected which is small, compared to the gross dimension of the system, yet large enough that the surface area of the matrix therein can be considered to be uniformly distributed throughout the volume element. The equation is shown to be valid for all saturated and non-saturated porous media systems which satisfy these postulates. *Subject Headings:* 1. Soil permeability 2. Darcy equation.—*Author's abstract.*

10C-41

551.556:551.579.5

Hanks, R. J. and Woodruff, N. P. (*U. S. Dept. of Agriculture, Agric. Res. Service, Manhattan, Kans.*), **Influence of wind on water vapor transfer through soil, gravel, and straw mulches.** *Soil Science*, Baltimore, 86(3):160-164, Sept. 1958. 2 figs., 2 tables, 8 refs. DLC—Taking cognizance of the fact that FUKUDA had failed to consider the total influence of wind on the water vapor transfer process (*Soil Sci.*, 79:249-256), the authors have conducted experiments which indicate that wind has a definite influence on water vapor transfer in soil, gravel and straw mulches, and that this influence was greater for gravel and straw mulches than for soil. The data show that the vapor conductivity of water vapor is increased with increased wind speed, and that diffusive conductivity is increased for a dry soil mulch as the depth to an impermeable layer is increased. Although not conclusive, the data also suggest that this occurs in gravel and straw as well. *Subject Headings:* 1. Wind effects on vapor transfer in soil 2. Soil water vapor transfer.—*Based on author's summary, R.P.*

10C-42

551.579.5(436)

*Heigel, Karl, **Die Bodenfeuchte in Abhängigkeit von Exposition, Bodenart und Bewuchs.** [Soil moisture as dependent on exposure, soil type and vegetation cover.] *Wetter und Leben*, Vienna, 9(6/9):104-108, 1957. 3 tables, 3 refs. DLC—Using the C-M (carbide) method, the author made extensive measurements of soil moisture content for two years at Hohenpeissenberg. Measurements were made every two weeks throughout the year at 12 points, each differing in elevation, exposition, type of soil and vegetation. The seasonal soil moisture content for each point, and the seasonal precipitation, and its deviation from the normal are presented in tables for each point. An analysis of the data (360 individual measurements) reveals that exposition, soil type and vegetation or microclimate determine decisively soil moisture content. Exposition and vegetation are not only involved in the absorption of precipitation but also regulate expenditures in the water balance, namely, water consumption by vegetation and evaporation. Percolation of water into the soil is a function of soil type. The level of soil moisture content in general remained constant during the two years. *Subject Headings:* 1. Soil moisture data 2. Hohenpeissenberg, Austria.—I.L.D.

10C-43

551.579.5:551.525.4

Herzog, Fritz. (*Wartenberg*), **Bodenfeuchtemessung durch Wärmeleitfähigkeitsbestimmung.** [Measurement of soil moisture by the determination of heat conductivity.] *Baden. Landeswetterdienst, Jahresbericht mit Abhandlungen*, 1951/1952. p. 124-128. 4 figs. DWB—Observing the temperature of a constantly heated element and the soil temperature itself, the soil moisture can be determined from a calibration graph. Sketch, wire diagram and calibration curve are shown. *Subject Headings:* 1. Soil moisture measurement techniques 2. Heat conductivity of soil.—A.A.

10C-44

551.579.5

†Holmes, R. M. and Robertson, G. W. (both, *Experimental Farms Service, Dept. of Agri., Canada*), **Evaporation climate and soil moisture control.** (1958.) 9 p. 5 figs., 2 tables, 23 refs. Mimeo. DWB (M79.5 H752ev)—This is a review on the present means of water budgeting and soil moisture control by using weather data. One of the phases of research in agricultural meteorology and soil physics is on water evaporation regimes from the earth to the air. Among the current methods of water budgeting described in this report are those developed in Canada at the Central Experimental Farm. The simplest method of budgeting soil moisture is by subtracting the daily potential evapotranspiration (PE) from the daily rainfall. This amount is then subtracted (or added when rain exceeds PE) from the moisture present in the soil to give the new soil moisture storage. Other methods of achieving this PE are referred to. *Subject Heading: 1. Soil moisture balance.—N.N.*

10C-45

551.579.5

†Hoyos de Castro, Angel and Martín Vivaldi, J. L., **La estatística del sistema "suelo-agua."** [Statics of the soil-water system.] *Spain, Consejo Superior de Investigaciones Científicas. Instituto de Edafología y Fisiología Vegetal, (Publicación),* No. 7, 1950. 150 p. 32 figs., 31 tables, 165 refs., 49 eqs. (*Monografías de Ciencia Moderna*, Madrid, No. 23.) **DLC** (S594.H6)—The type of soil moisture discussed in this monograph is the moisture absorbed by hygroscopic particles in the soil rather than the moisture retained by capillarity or the free water. An extensive review of world literature is made and data are presented on moisture absorption in soil as a function of cation properties, properties of the colloidal material osmotic pressure, temperature, etc. Apparatus for investigating these phenomena is described. *Subject Headings: 1. Soil moisture 2. Soil moisture bibliographies.—G.T.*

10C-46

551.508.79:551.579.5

Ianakiiev, K. P., **Piknometrichen metod za bürzo i ikonomichno opredeliiane na vlagata v pochvata.** [Pycnometric method for quick and cheap determination of soil moisture.] *Khidrologiia i Meteorologiia*, Sofia, No. 3:54-56, 1956. table, ref., 3 eqs. **DLC**—An extremely simple weighing method of soil moisture determination is described and illustrated by an example. The method is found to be well within the limits of accuracy required for such practical purposes as calculation of the amount of irrigation required. *Subject Headings: 1. Pycnometers 2. Soil moisture measurement techniques.—G.T.*

10C-47

551.579.5:061.3

International Congress of Soil Science, 6th, Paris, 1956, **Rapports**, Vol. A, B, C, E. Paris, 1956. 4 v. **DA** (56.09 In8452)—Vol. B contains the papers delivered at the meetings of Commission I, Soil Physics. The following contributions deal with soil moisture. Rim, M. (*Israel*), **Quantitative methods for pedodiagnosis applicable also in climates conducive to differential motion of particles in the soil**, p. 8-13. 2 figs., refs. Tamm, Olof (*Sweden*), **L'évapotranspiration dans la région forestière de la Suède**, [Evapotranspiration in the forest region of Sweden], p. 15-20. 2 figs., refs. Youngs, E. G. (*England*), **A laboratory method of following moisture content changes**, p. 89-93. 2 figs., 5 refs. Rode, A. A. (*U.S.S.R.*), **Les divers types du régime hydrologique des sols**, [The different soil water regime types], p. 117-125. tables, refs. Rode, A. A., **Catégories et formes de l'eau du sol et les propriétés hydrologiques des sols**, [Soil water types and forms of hydrological properties of soils], p. 135-147. figs., tables, refs. De la Rubia, J. and Blasco, F. (*Spain*), **About the moisture equivalent determination**, p. 201-203. table, 13 refs. Blasco, F. and De la Rubia, J., **Hygroscopicité et volume de la surface active**, [Hygroscopicity and active surface volume], p. 217-219. 3 tables, 10 refs. Blasco, F. and De la Rubia, J., **Capacité maxima pour l'eau. Relations de l'eau capillaire**, [Water maximum capacity. Capillary water relationships], p. 221-225. figs. Kazo, Béla (*Hungary*), **Influence de la structure de la surface du sol sur sa capacité de rétention d'eau**, [Influence of soil surface structure on its water retention capacity], p. 233-236. fig. Klimes-Szmik, A. (*Hungary*), **Effect exerted on the water economy of sandy soils by substances containing organic or inorganic colloids and applied in layers**, p. 237-245. 4 figs., 5 tables. Childs, E. C. (*England*), **Recent advances in the study of water movement in unsaturated soil**, p. 265-274. refs., 19 eqs. Deriagin, B. V.; Zashovaeva, N. N.; Melnikova, M. K. and Nerpin, S. V., (*U.S.S.R.*), **Theory of equilibrium and migration of soil moisture at various moisture contents**, p. 291-297. 13 refs., 4 eqs. Deriagin, B. V. and Melnikova, M. K., **Experimental study of the migration of water through the soil under the influence of salt concentration, temperature and moisture gradients**, p. 305-314. 9 figs., 8 refs. Hallaire, M. (*France*), **La diffusion de l'eau dans le sol sous les deux formes: liquide et vapeur, au voisinage de la surface d'évaporation**, [Water diffusion into the soil under liquid and vapor forms, near the evaporating zone], p. 337-344. 2 figs., eqs. Klute, A.; Bruse, R. R. and Russel, M. B., **The application of the diffusivity concept to soil moisture movement**, p. 345-354. 3 figs., 18 refs., 15 eqs. All papers have summaries in English, French and German. *Subject Headings: 1. Soil moisture 2. Soil physics symposia.—G.T.*

10C-48

551.579.5:631.51

Iovenko, N. G., *Izmenenie vlazhnosti pochvy pod vlianiem bezotval'noi vspashki*. [Change in soil moisture induced by tillage with plows lacking moldboards.] *Meteorologiya i Gidrologiya*, No. 1:41, Jan. 1957. DWB, DLC—The Ukrainian Hydrometeorological Institute investigated the effect of a new system of plowing upon the accumulation of moisture in the one and a half meter layer of podzolized light clayey, chernozem soil, clayey chernozem, ordinary heavy clayey chernozem, southern chernozem and southern heavy clayey chernozem. Ordinary fall plowing to a depth of 22–25 cm, and moldboard plowing to a depth of 35–45 cm, were compared. The results indicate that with moldboard plowing the soil moisture in the upper one and a half meter layer is greater than in the case of usual plowing. The difference amounts to 23–40 mm. The only exception was in the case of sandy and light clayey gray forest soils underlain by easily permeable sandy types. *Subject Headings: 1. Soil moisture conservation 2. Plowing effects on soil moisture.*—I.L.D.

10C-49

551.525:551.579.5

*Jackson, Ray D. and Kirkham, Don, *Method of measurement of the real thermal diffusivity of moist soil*. *Soil Science Society of America, Proceedings*, 22(6):479–482, Nov./Dec. 1958. 6 figs., 11 refs. DWB, DLC—To get away from thermally induced errors in soil diffusivity measurements, an alternating heat source was used to allow moisture transfer in alternate directions (thus reducing moisture movement errors). These errors are further reduced by measuring the apparent thermal diffusivity at decreasingly smaller periods (with corresponding smaller temperature gradients) of the alternating heat source. These results plotted on a curve which can be extrapolated to zero period gives a value of diffusivity (real diffusivity) for zero temperature gradient. This method was used on samples of clay loam and sand at a number of moisture contents and tensions. The diffusivities increase steadily as moisture increases to saturation. This differs from former results showing maxima at < saturation. These maxima occur in apparent and real diffusivities. *Subject Headings: 1. Thermal diffusivity of soil 2. Soil moisture effects on diffusivity.*—*Author's abstract and M.R.*

10C-50

551.579.5

Johansson, Simon, *Markens vattenhushallning*. [The water balance of soil.] *Lantbruksakademien, Stockholm, Tidskrift*, 79(4):273–292, 1940. tables, bibliog. p. 291–292. German summary p. 291. DLC—Various theories on the physical properties of different soil types in relation to water economy of plants are discussed. It is shown that the water consumption of plants depends largely on available ground water. Fertilizing favors reduced water consumption. Author's theory, as advanced some 30 yrs ago, that saturation in soil takes place gradually and to a depth corresponding to magnitude of the precipitation still holds. *Subject Headings: 1. Soil moisture physics 2. Water balance of soil.*—W.N.

10C-51

551.579.5:551.510.7

Jordan, J. V.; Lewis, G. C. and Fosberg, M. A. (all, *Univ. of Idaho, Moscow, Idaho*), *Tracing moisture movement in slick-spot soils with radiosulfur*. *American Geophysical Union, Transactions*, 39(3):446–450, June 1958. 7 figs., 2 tables, 7 refs. DWB, DLC—Preliminary greenhouse tests, using slick-spot soil and associated soil in columns, indicated that cobalt⁶⁰ and sulfur³⁵ moved through the soil columns and appeared in the first drainage water. The first field experiments were run south of Boise on the Sebree-Chilcott associated series. Radiosulfur was used in the form of dilute sulfuric acid soaked into absorbent cotton. Each wad was specifically placed in or adjacent to a slick spot. After several months, soil samples from these tagged slick spots indicated that some characteristic water movement had occurred. Improved techniques have been developed and the study will expand to include slick-spots soils in irrigated and dryland areas. *Subject Headings: 1. Soil moisture movement 2. Radioactive tracer techniques.*—*Authors' abstract.*

10C-52

551.579.5

Juhász, József, *A beszivárgás vizsgálata*. [Study of infiltration.] *Hidrológiai Közöny*, Budapest, 38(4,5):262–272, 343–351, Aug., Oct. 1958. 15 figs., 13 tables. Summaries and captions in German and English. DWB—A review of world-wide progress in the field of infiltration experiments and empirical formulas derived therefrom. The principal factors considered are infiltration time, soil porosity, soil moisture, and precipitation amount. The physical process of infiltration is discussed in detail. It is noted that "according to L. K. SHERMAN, infiltration curves obtained for the same soil at different moisture contents are similar." *Subject Heading: 1. Infiltration.*—G.T.

10C-53

551.579.5:581.14

Karlov, E. M., *O prichinakh piatnistosti rastitel'nogo pokrova v Vostochnom Kazakhstane*. [Causes of the mottled vegetable cover in eastern Kazakhstan.] *Pochvovedenie*, Moscow, No. 5:101–105, 1958. 2 tables, fig., 6 refs. English summary p. 105. DLC—In natural conditions the proc-

esses of an accumulation of moisture in the soil by condensation (sorption) from the soil air are widely spread. One of the main causes of this process form the temperature conditions, particularly the daily fluctuations of soil-ground temperatures. Another important cause are the underlying deposits consisting of rubble, boulders and gravel. The temperature fluctuations condition the formation of condensation (sorbed) soil moisture, available for plants, that accumulates only in deposits of a coarse mechanical composition. The difference of the thickness of the layer of cover loams in the foreland plains of Saura-Tarbatai-Altai determines the quantitative aspect of the process, favoring the formation in the soils of areas with various moisture contents. The differences in moisture content of subsoil horizons cause, in the main, the variety of the vegetative cover of eastern Kazakhstan. *Subject Headings: 1. Soil moisture effects on plants 2. Eastern Kazakhstan.—Author's abstract.*

10C-54

551.508.79

Kazanskiĭ, I. L., *Ob uluchshenii pochvennykh burov*. [Improvement of soil augers.] *Me-teorologĭia i Gidrologĭia*, No. 6:47-48, June 1956. fig. DWB, DLC—Various defects of a soil auger, widely used in the U.S.S.R., are itemized and suggestions are offered for improving the quality of augers and reducing the cost of production. These are as follows: to improve the quantity of the steel and to apply cement to the cutting part of the tube; to construct the tube so as to facilitate solution and extrication of the auger, etc. A diagram of an improved head of an auger is presented. *Subject Heading: 1. Soil augers.—I.L.D.*

10C-55

551.508.79:551.579.5

Klychnikov, V. M., *Pribor dlia opredeleniia vodopronitsaemosti pochvogruntov v polevykh usloviakh*. [An instrument for the determination of soil permeability under field conditions.] *Pochvovedenie*, Moscow, No. 9:851-859, Sept. 1952. 3 figs., 4 tables, 3 refs. DLC—Description of a simple automatic apparatus for the determination of infiltration and percolation velocity on the basis of the Mariotte container, using air pressure avoiding moving parts. The water level can be maintained at a very precise constant height. Results of measurements are presented for different soils. *Subject Heading: 1. Soil moisture instruments.—A.A.*

10C-56

551.508.79:551.579.5

Koliasev, F. E., *O podvizhnosti vody v pochve i putiakh ee regulirovaniia*. [Mobility of water in soils and means of regulating it.] *Pochvovedenie*, Moscow, No. 4:53-62, April 1957. 6 figs., 2 tables, 15 refs. German summary p. 62. DLC—The method of drying speed curves of soil samples exposed in the paper makes it possible to establish the rate of mobility of water in the soil, depending on moisture, mechanical and aggregate soil composition, density and other physical conditions. The method enables one to obtain (under laboratory conditions) data on water properties of soil, namely: on moisture corresponding to the field moisture capacity, to retardation of plant growth and to steady wilting of plants and on the maximum soil hygroscopicity. The study of the soil's drying kinetics under laboratory and field conditions enables one to devise measures for regulating the water regime of soils by means of cultivation and fertilization. *Subject Headings: 1. Soil moisture measurement techniques 2. Soil moisture conservation.—A.M.P.*

10C-57

631.67:551.579.5(478)

Kolpakov, V. V., *Oroshenie osnovnykh sel'skokhoziaĭstvennykh kul'tur v zone Volgo-Don'skogo sudokhodnogo kanala imeni V.I. Lenina*. [Irrigation of basic crops in the zone of the V. I. Lenin Volga-Don navigable canal.] Moscow. *Moskovskaia Sel'skokhoziaĭstvennaia Akademiia, Izvestiia*, No. 2:91-130, 1953. 16 figs., 36 tables, 7 refs. DLC (S13.M555)—An elaborate treatment, giving a good insight into the methods of scientific irrigation with due regard to climatic conditions in this region, which are characterized by data for precipitation and its variability, temperature, snow cover, evaporation, and soil moisture reserves for prevailing crops and agricultural practices. *Subject Headings: 1. Irrigation 2. Soil moisture 3. Agricultural climatology 4. Volga-Don Canal, U.S.S.R.—A.A.*

10C-58

551.579.5:633.11

Kopyt, A. D., *Osobennosti vodnogo rezhima pochvy pod iarovoĭ pshenitseĭ pri razlichnykh sposobakh ee obrabotki*. [Characteristics of the water regime of soil under summer wheat with various means of cultivating it.] *Me-teorologĭia i Gidrologĭia*, Leningrad, No. 1:33-37, 1958. 2 figs., table. DWB, DLC—The results of a study on the water regime of virgin and fallow soils in the Esil' District in Akmolinsk Oblast (Kazakh S.S.R.), carried out during 1955 and 1956 with a view to determining the conditions of water supply for summer wheat created by the soil cultivation technique of T. S. MAL'TSEV (the soil is plowed without a model board and is rendered fixable) are

presented. The soil of this region and the meteorological conditions during the two years of study are described and data are presented on the accumulation of an expenditure of soil moisture in fields of summer wheat cultivated by different methods. The cultivation of virgin soil with a plow to a depth of 22-25 cm creates the most favorable conditions for the water supply of summer wheat, as compared with cultivation with a disk-harrow and subsequent deep breaking up. The stubble left over the winter increases the water supply in the soil. Deep plowing without a mold board (under the second and third crop) yields a higher accumulation of soil moisture at the beginning of spring. The surface cultivation of soil under the second crop decreases the expenditure of moisture by evaporation from the surface. Such cultivation under a third crop increases the expenditure of moisture as a result of inspissation of the soil. *Subject Headings:* 1. Soil moisture conservation 2. Summer wheat cultivation 3. Akmolinsk Region, Kozakhstan.—I.L.D.

10C-59

551.579.5:631.4

Koroleva, O. N., *Dinamika nitratov i vlazhnosti v obyknovennykh chernozemakh Kuibyshevskoi oblasti pri razlichnom ikh ispol'zovanii*. [Dynamics of nitrates and humidity in ordinary chernozems of the Kuibyshev region under different conditions of their use.] *Pochvovedenie*, Moscow, No. 10:76-81, Oct. 1958. 1 figs., 7 tables. DLC—The observations of nitrate and moisture dynamics in soils of certain fields under various crops were conducted at the Kuibyshev Agricultural Institute by studying soil samples taken during various phases of plant development in the summer of 1944 and 1945. The results presented in tables show that dynamics of water reserves was different in different fields. In the upper levels the quantity of water depends on precipitation amounts; in the deeper layers the oscillation range decreases due to the lack of plant transpiration, and soil humidity did not decrease below 25% even during prolonged drought. Ordinary chernozems contain sufficient quantities of nitrate for plant growing, but mobile phosphates are deficient in all fields. The soils possess a high nitrifying capacity and can accumulate under fallow conditions large quantities of nitrate which is not fully used by crops in the following years. Information on precipitation amounts—annual, monthly and daily means, snow conditions and air temperatures are supplied. *Subject Headings:* 1. Soil moisture balance 2. Nitrogen content of soil.—A.M.P.

10C-60

551.5:63:06

Korte, W., *Tätigkeitsberichte der agrarmeteorologischen Dienststellen Braunschweig-Völkenrode*. [Activity report of the Agro-meteorological Office at Brunswick-Völkenrode.] *Germany. Deutscher Wetterdienst, Mitteilungen*, 2(14):30-34, 1955. fig., tables. DWB—The agricultural duties of the Brunswick-Völkenrode Agrometeorological Station established in 1954 are outlined and the investigation carried out during this year and planned for 1955 are described. The studies deal primarily with the water balance of the soil and of plants and the effect of irrigation, combined field experiments on various problems of field cultivation, manuring and irrigation. *Subject Headings:* 1. Agrometeorological services 2. Hydrologic cycle 3. Brunswick-Völkenrode, Germany.—I.L.D.

10C-61

551.525.2 551.579.5

Kozma, Ferenc and Varga, Zoltán H., *Különböző anyagokkal takart talajok hőmérsékleti viszonyai*. [Temperature conditions of soils covered with various materials.] *Időjárás*, Budapest, 51(3):199-207, May/June 1957. 5 figs., 5 tables. Russian summary p. 199. DLC—The soil in a corn field at Martonvasar Agricultural Experiment Station was covered during the growing period of 1956 with a chemical promoting porosity, with compost, soil from Buda, powdered coal and chaff. In this paper data on soil temperature (2, 5, 10 and 20 cm depth), soil moisture and corn crop in the different sections of the field are presented and discussed. General weather development during the experiment is described. *Subject Headings:* 1. Soil temperature water various covers 2. Soil moisture 3. Martonvasar Agricultural Experiment Station, Hungary.—G.T.

10C-62

551.579.5:631.67

†Krimgold, D. B., *Economic feasibility of supplemental irrigation*. *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(3):411-420, 1954. 4 tables, fig., 30 reiss. DWB. Reprinted in full from *Agricultural Engineering*, 35(1):22-27, Jan. 1954.—The lower limit of the optimum range of soil moisture for growth is 70% of field capacity for clay loams and 50% for sandy loams. It is economically justified to irrigate when soil moisture drops below these values. Daily moisture deficiencies and their frequency were computed for Seabrook. *Subject Headings:* 1. Irrigation 2. Thornthwaite's method 3. Soil moisture deficiency 4. Seabrook, N. J.—A.A.

10C-63

551.579.5:631.44

Kubo, J. and Abe, I., *Soil surface condition and soil moisture*. *Japan. Central Meteorological Observatory, Tokyo, Memoirs of Industrial Meteorology*, 18(2):103-106, March 1955. fig., 5 tables,

refs., eq. In Japanese; English summary p. 106. **DLC**—The authors classified the soil surface conditions into six types, on a basis of the classification by KUSAKABE. For each type of surface conditions, the frequency distribution of soil moisture was proved to be a normal distribution, and the interval of soil moisture contained with the confidence coefficient of 90% was determined. *Subject Headings: 1. Soil moisture data 2. Soil classification.—Authors' abstract.*

10C-64

551.508.79:551.579.5

Kusakabe, M., On a rapid determination method of the soil moisture. *Japan. Central Meteorological Observatory, Tokyo, Memoir of Industrial Meteorology*, 16(1):33-35, Aug. 1952. 2 figs., ref. In Japanese; English summary p. 2-3. **MH-BH**—A slight improvement on PAPADAKIS' method was made to remove its two weak points: (1) The author developed equipment made of glass (as illustrated) which is a convenient means of weighing the sample, driving out the air and disposing waste and (2) The author devised the use of a small amount (constant volume, e.g., 1c. c.) of light liquid (e.g., ligroine, benzol, etc.) together with water, so that the personal error arising from the reading of the meniscus by the level of floating foam was remarkably reduced. *Subject Heading: 1. Soil moisture instruments.—Author's abstract.*

10C-65

551.579.5(52)

*Kusakabe, M., On the soil moisture observation at Owada, Pt. 1. *Japan. Central Meteorological Observatory, Tokyo, Memoirs of Industrial Meteorology*, 18(2):87-102, March 1955. 5 figs., 6 tables. In Japanese; English summary p. 101-102. Pt. 2. *Ibid.*, 19(1):35-50, Dec. 1955. 11 figs., 5 tables, 18 refs. In Japanese; English summary p. 49-50. **DLC**—In Pt. 1, soil sampling and moisture measuring devices are described, physical properties of soils are tabulated, moisture measurements in samples, horizontal distribution of soil moisture at earth's surface in dry, wet and saturated soil, monthly values of soil moisture at surface, 5, 10, 20, 50 and 100 cm, frequency distribution of soil moisture for various weather types and correlation between soil moisture at different depths (5 to 5 cm, 5 to 10 and 10 to 20 cm) during each month are given in tables and graphs. Pt. 2 contains data on seasonal variations of soil moisture at various depths (to 100 cm), of precipitation, evaporation and effective precipitation, relation between effective precipitation and water content of soil, correlation between soil temperature and soil moisture, diurnal temperature variation of dry and saturated soil, etc., estimation of soil moisture from visual observation of soil surface and from meteorological data are discussed. (Pt. 1 same item as 8.5-288, May 1957, *MAB.*) *Subject Headings: 1. Soil moisture data 2. Soil moisture variations 3. Owada, Japan.—M.R., G.T.*

10C-66

551.579.5

Kut'ko, L. F., *Primenenie uskorennoy sushki pri opredelenii vlazhnosti peschanykh i supeschanykh pochv.* [Application of accelerated drying in determining humidity degree of sandy and sandy-loamy soils.] *Pochvovedenie*, Moscow, No. 6:108-111, 1957. 4 tables, 7 refs. **DLC**—In order to verify the applicability of an accelerated method of drying soil samples to determine of soil humidity according to which the standard 8-hour drying at 105°C can be replaced by a 2-hour drying at 150°C, comparative determinations were carried out with 5 kinds of sandy and sandy-loamy soil samples. It was found that in all experiments the difference was insignificant and therefore the accelerated method suggested by A. P. BIRIVKOVA should be used, as it increases labor productivity and does not alter the results. *Subject Headings: 1. Soil moisture measurement techniques 2. Dnieper River Basin.—A.M.P.*

10C-67

551.588.3 551.584.3:631.4

Landsberg, H. E. and Blanc, Milton L., Interaction of soil and weather. *Soil Science Society of America, Proceedings*, 22(6):491-495, Nov./Dec. 1958. 5 tables, 21 refs., 3 eqs. **DWB**—The importance of radiation, albedo, soil and air temperature, turbulence near the ground, soil moisture gains due to precipitation, condensation and absorption, and losses due to evaporation, transpiration and percolation of ground water, heat budget (convection, storage in soil and evaporation), soil gases and chemistry (CO₂, N, etc.), possibilities and methods of microclimate control (changing radiation, albedo, moisture or heat transfer by dust coverings, shelter hedges or slope changes) and effects on various crops, instruments used especially for microclimatic studies, etc. are discussed and quantitative examples given briefly. (For abstract from different source, see 10.1-335, Jan. 1959, *MAB.*) *Subject Headings: 1. Crop microclimatology 2. Soil moisture-climate relationships 3. Soil-atmosphere interaction.—M.R.*

10C-68

551.508.79:551.579.5

Lassen, Leon and Lull, Howard W., Infiltration and the use of the infiltrometer. *I.U.G.G. Association of Scientific Hydrology, Brussels*, 1951, [*Transactions*], v. 3:310-315, 1952. 2 figs., ref. **DWB**—In using infiltrometers, a marked distinction must be made between infiltration and percola-

in water and capacity. Physical processes involved in the measurement of these values are discussed and comparing laboratory and actual sampling of soil moisture. Subject Headings: 1. Indirectly measured moisture.—A.A.

- 10C 69
Lukacs, János and Tóth, János. Szagfőzetővázlatok vizsgálati tapasztalatai. [Measurement of moisture content in (1) capillary, (2) noncapillary clays, Hungary. Sz. 1: 411-431, Jan. 1956. 12 p. 4 tables. 21 refs. German and English summaries p. 129-130. D.W.B.—Results of a study of capillary water equilibrium in soil, clay and other soils. Hungary, are reported. May 1955-May 1956. Some soil and water are subjected during preparation, and comparative experiments with capillary, noncapillary, and other soils, with temperature, preparation, and soil texture, and water table variations are reported. Instruments and techniques used in sampling, and temperature measurements, etc., are described and illustrated. Subject Headings: 1. Indirectly measured moisture. 2. Soil moisture measurement. 3. Soil texture, Hungary.—C.T.

- 10C 70
Mallory, R. M. Spectrophotometric indirect volumetric method. [Soil humidity determined by an indirect method. Pennsylvania Museum No. 2 111-603 1957. Fig. 1 table. 10 refs. D.W.B.—The method of determining soil moisture described by the author is based upon the principle that when soil is water vapor only, as found in the absolute dry weight and weight in the same medium. From the equation $P = P - (x + y) - (x + y) = x - x + y$ where P = weight of soil in water, x = volume of 1 g of water or dry matter, and y = volume of water displaced by the dry matter of soil and by water there is obtained the equation $P - x + y = x - x + y$ where $K = x - y$. Computations with this equation are presented and the results of moisture determination with different methods are compared. The equation method was a variation of 11, as compared with the gravimetric method. Subject Headings: 1. Soil moisture measurement techniques. 11C.

- 10C 71
Mallory, R. M. Physical-chemical properties of solid-liquid interfaces in soil systems. [Soil water theory of interest. Proceedings. 11: 446-491, Nov./Dec. 1955. 3 figs. table. 19 refs. D.W.B.—The occurrence of water and its water films in soils is discussed. Estimates of the thickness of the films made by Lippmann and Kowalewski show the importance of long-range force fields, in water retaining the moisture. At high RH values corresponding to low humidity, condensation phenomena and X-ray data indicate that condensation processes increase as indicated by marked changes in humidity changes. In this region the water films of different thicknesses can occur. A method is used to determine the mechanical properties of soil systems and better are revealed. From a study of the chemical process after a study described. Factors affecting the condensation process are seen in some parts outside the soil system. The condensation of water in the atmosphere is also important. Finally, an understanding of the physical properties of the soil in relation to plant growth will become a definite one of the chemical and physical chemical phenomena of plant growth. (1) the energy balance in plant-soil-water exchanges and (2) the study of a process in the theory of the soil. Subject Headings: 1. Soil moisture film thickness. 2. Soil-plant growth relationships. 11C.

- 10C 72
Maruyama, S. Effects of moisture in the heat conductivity, heat diffusivity, specific heat and percent specific volume of the heat and the moisture of heat and clay. Preliminary report. Paper presented. Agency. Tokyo. Members of Institute of Geography. 11: 1-12 1957. 3 figs. 4 refs. In Japanese. English summary p. 11. D.W.B.—The thermal properties of soil are well known but advanced by the water content. Their values are not widely generalized, but Fetter has stated these relationships by an equation from thermal conductivity. The soil used in the experiment was however composed of dry sand. In this case results can not be applied to such soils as the author has used. The method employed in this study is a dry physical. The soils examined were of two types of soil. (1) the heat and the moisture of heat and clay. And the heat conductivity, (2) diffusivity, specific heat and specific volume are determined in relation to the water content. It appears to be of a brick cylinder which contains the soil coated by a jacket of the and water. (3) water thermocouples are inserted into the soil at three separate points. The equation of the heat conductivity of soil to the cylinder is

$$-C_p R \frac{\partial \theta}{\partial x} = \frac{1}{v} \left[\frac{\partial \theta}{\partial t} + \frac{1}{v} \frac{\partial \theta}{\partial x} \right] \quad (1)$$

Approximate representations of the temperature derivatives, respective to the distance from the center of cylinder and to time, are:

$$\frac{\partial \theta}{\partial r} = \frac{\frac{\theta_1 - \theta_2}{\Delta r_1} + \frac{\theta_2 - \theta_3}{\Delta r_2}}{2} = \frac{\theta_1 - \theta_3}{2\Delta r} = \frac{\theta_1 - \theta_3}{4} \quad (2)$$

$$\frac{\partial^2 \theta}{\partial r^2} = \frac{\frac{\theta_1 - \theta_2}{\Delta r_1} - \frac{\theta_2 - \theta_3}{\Delta r_2}}{2} = \frac{(\theta_1 - 2\theta_2 + \theta_3)/2}{\frac{4}{2}} = \frac{\theta_1 - 2\theta_2 + \theta_3}{4} \quad (3)$$

$$\therefore \frac{\Delta \theta}{\Delta t} = K \frac{1}{8} (3\theta_1 + \theta_3 - 2\theta_2) \quad (4)$$

$$K = \frac{\Delta \theta}{\Delta t} \bigg/ \frac{(3\theta_1 + \theta_3 - 2\theta_2)}{8},$$

where θ_3 , θ_2 and θ_1 are soil temperatures at three different points off the center. Values of the specific heat of the soils are obtained by using another appliance, a calorimeter and a thin rubber sack packed with soil of known moisture content. The results obtained are shown in a fig. *Subject Headings: 1. Soil temperature-moisture relationships 2. Soil moisture effects on diffusivity 3. Heat conductivity of soil.—Author's abstract.*

10C-73

551.579.5:631.67

Mastinskaia, S. B. and Meshchaninova, N. B., *Agrogridologicheskaja effektivnost' orosheniia zernovykh kul'tur na iugo-vostoke Evropeiskoi territorii SSSR*. [Agrohydrological effectiveness of irrigation of grain fields in southeastern European USSR.] Moscow. *Tsentral'nyi Institut Prognozov, Trudy*, No. 53:3-19, 1957. 2 figs., 11 tables, 14 refs. **DLC**—After summarizing briefly various recommendations on the frequency of irrigation corresponding to various developmental stages of plant growth and soil moisture content, the authors discuss the variation of soil moisture under different weather conditions and the propitiousness of different supplies of moisture in various vegetation phases of agricultural crops under irrigation conditions. The data for this study were obtained in 1952-1954 in Buzuluk (Chkalov Oblast). The difference in the moisture content of the meter layer of soil under irrigated and nonirrigated wheat is determined at the start of vegetation by irrigation of preceding years. The rate of expenditure of soil moisture under irrigated conditions is considerably greater under unirrigated conditions; wheat fields under irrigation lose during vegetation 5-6 mm of moisture per day, unirrigated fields lose 1-3 mm per day. The quantitative relationship of the expenditure of moisture by fields with irrigated wheat (U) to initial moisture supply in the soil (x), air temperature (y) and amount of precipitation and the amount of precipitation (z) during the period shoot formation-ripeness is expressed for the Buzuluk district, $U = 0.03x + 0.30y - 0.46z - 5.9$. The effectiveness of the utilization of soil moisture by summer wheat is greater under irrigation conditions than without irrigation and the effectiveness of irrigation was higher in dry years than in favorable years. The ratio of expenditure of moisture per unit grain harvest from nonirrigated and irrigated fields was 2.6 in the dry year and 1.3 in the favorable year. Differences in the regime of soil moisture of irrigated and nonirrigated fields caused large differences in the condition of the plants and yield of summer wheat; irrigated plants were 1.5-3.0 taller than non-irrigated plants; the number of ear-bearing stalks is twice as great on irrigated fields, etc. The quantitative relationship of the height of summer wheat (z) on the amount of moisture in the soil (x) and air temperature (y) is given by the equation:

$$z = 0.017x - 0.11y - 1.6.$$

Subject Headings: 1. Agricultural hydrology 2. Irrigation 3. Water use by plants 4. Soil moisture requirement 5. Soil moisture data 6. Buzuluk, U.S.S.R.—I.L.D.

10C-74

551.579.5

*Miller, E. E. and Elrick, D. E., *Dynamic determination of capillary conductivity extended for non-negligible membrane impedance*. *Soil Science Society of America, Proceedings*, 22(6):483-486, Nov./Dec. 1958. 3 figs., 2 tables, 4 refs., 7 eqs. **DWB**—W. R. GARDNER's recent method for determining capillary conductivity from the transient outflow of a slab, following a small step-change of pressure, has been extended to cases in which the impedance of the supporting membrane or porous plate must be taken into account. From this theoretical result, a practical method is developed employing all of the experimental data (not just the exponential tail) for determining K

values accurate within the inherent limits of the data. *Subject Headings:* 1. Capillary conductivity of soil 2. Capillary flow 3. Soil moisture coefficients.—M.R.

10C-75

551.579.5:551.515.8

Minina, L. S., *Vliianie podstilaiushchei poverkhnosti na izmenenie vlagosoderzhaniiia vozdukhha evoliutsiiu kholodnogo fronta letom nad Evropeiskoi territoriei SSSR.* [Effect of the underlying surface on changes in atmospheric moisture content and on cold-front development in the summer over European U.S.S.R.] Moscow. *Tsentral'nyi Institut Prognozov, Trudy*, No. 60:65-79, 1957. figs., 7 tables, 4 refs., eq. DWB (M(055) U581tts)—The author presents the fundamental results of investigations on the influence of the underlying surface upon the change in the moisture content of air masses and the evolution of the cloud system and precipitation of a cold front. The contents of this paper are as follows: method for determining additional humidification of moving air masses by means of synoptic aerological data; analysis of the variation of the moisture content and temperature of an air current during its movement over an inhomogeneous underlying surface, including variation in moisture content during the passage of an air mass from dry to moist soil (damp and wet); variation in temperature of an air mass as a function of degree of humidification of the underlying surface; variation in the height of the level of condensation during the movement of air mass from dry to moist soil, and variation of moisture content during the movement of air from moist to dry soil, frequency and duration of cold fronts over the European U.S.S.R.; evolution of frontal precipitation in the zone of sufficient and deficient soil moisture and evolution of frontal cloudiness and precipitation during the movement from moist to dry soil and to humid soil within the European U.S.S.R. The absolute moisture content of air masses moving from dry to moist soil perceptibly increases; the greatest increase is observed in the lower 1.5-3 km of the troposphere. When air masses move from dry to damp soil (moisture in the upper layers 60-70% of field capacity) the increase in the moisture content in the atmosphere layer near the ground varies from 1 to 4 g/kg depending upon the initial temperature and difference between temperature and dew point. In the presence of an inversion, or layers with reduced vertical temperature gradients, the increase of moisture content in the upper layer is at best very slight. When an air mass moves from moist to dry soil, the absolute moisture content diminishes. The probability of precipitation and of increased cloudiness rises when air masses become humidified during movement over moist soil. In the passage of fronts from moist to dry soil frontal cloudiness and precipitation degenerate even in cases of deepening of the pressure trough. *Subject Headings:* 1. Moisture exchange soil-atmosphere 2. Soil moisture effects on air masses.—I.L.D.

10C-76

551.579.5:061.3

551.586:631.67

New Zealand. Dominion Physical Laboratory, Lower Hutt, *Proceedings of the Conference on Soil Moisture*, held at the . . . Laboratory, Sept. 1954. New Zealand. *Dept. of Scientific and Industrial Research, Information Series*, No. 12, 1956. 174 p. figs., tables, refs. DLC (S594.L68)—Most of the papers presented in this symposium deal with soil moisture problems of agricultural significance. The 16 papers are grouped into 5 sections as follows.

The Importance of Soil Moisture

Gibbs, H. S., *Notes on the importance of soil moisture.* p. 9-14.—A general discussion of the various forms of soil moisture and moisture movement, and their relationships with soil structure and plant growth.

Packard, R. Q., *Soil moisture for plant growth.* p. 15-23. 2 figs., refs.—Stresses "the dependence of growth on moisture tension" and "the influence of unsaturated permeability on soil-root relations."

Northey, R. D., *Soil moisture and civil engineering.* p. 24-33. refs.—Discusses the effects of quantity, quality and movement of soil water upon mechanical properties of soils.

Smith, L. P., *Soil moisture work in England.* p. 34-37. ref.

Agricultural Aspects of Soil Moisture

Mitchell, K. J. and Butler, G. W., *Soil moisture in relation to pasture growth.* p. 46-56. figs., refs.—"The objects of this paper are to outline the manner in which a pasture can regulate its moisture regime, firstly by influencing the immediate microclimate, and secondly by physiological regulation of water and ion movement."

Hupkens van der Elst, F. C. C., *Moisture relationships in peat.* p. 57-61. 2 figs.—Contains graphs comparing rainfall and pasture production on clay loam and on overdrained and properly drained peat.

Richards, M., *Soil moisture and horticulture.* p. 62-65. refs.

Jones, R. L., *Dew as a factor in plant-water balance.* p. 66-72. fig., refs.—In reviewing the literature on dew, it is found that its importance in plant-water balance is fully recognized in arid

regions of the world. In other regions, following the development of better methods of dew measurement, the effect of dew on plant growth is found to be greater than hitherto assumed. In the "partial drought" areas of New Zealand, dew measurement is proposed so that a local knowledge of the dew factor may be obtained. [Author's summary.]

Drainage and Irrigation

Hopewell, H. G., **Soil moisture measurements in relation to soil drainage research.** p. 78-81.—The broad features of the soil drainage research program carried out at Massey Agricultural College are outlined. The requirements as regards soil moisture measurements are discussed briefly. Some comments are made on the growth of pasture as influenced by soil drainage. [Author's summary.]

Campbell, D. A., **Investigating the soil's capacity to control run-off and soil loss.** p. 82-86. fig.—Reports preliminary results of measurements and experimental work aimed at determining the effect of various kinds of management upon infiltration, runoff and soil loss.

Rickard, D. S., **Irrigation and soil moisture relationships on a light Canterbury soil.** p. 87-96. tables, refs.—Includes meteorological data.

Estimation of Irrigation Requirements

van't Woudt, B. D., **On the estimation of irrigation needs in New Zealand.** p. 109-121. 3 figs., 2 tables, refs.—Potential of irrigation, water needs and water resources in New Zealand are discussed from the point of view of the hypothesis that the rate of vegetative growth accelerates with increasing availability of soil moisture. Data are presented on rainfall and evaporation from open water surfaces and evapotranspiration from a pasture, grass production in relation to meteorological parameters, crop weight in relation to evapotranspiration, estimated duration of effect of water application on pasture growth, etc.

Gabites, J. F., **The estimation of natural evaporation and water need.** p. 122-131. 6 figs., refs. (For abstract, see 9.1-238, Jan. 1958, MAB.)

Closs, R. L., **Penman's method for estimating soil moisture from evaporation.** p. 132-147. 4 figs., 4 tables, refs., 12 eqs.—Finds PENMAN's method of indirect soil moisture estimation to be applicable to New Zealand and sufficiently accurate, especially in view of difficulties encountered in direct soil moisture measurement.

Measurement of Soil Moisture

Noble, P. F., **Techniques in soil-moisture measurement.** p. 151-158. refs.—A review of existing methods, with 20 literature references.

McCallum, G. J., **Soil moisture determination by neutron methods.** p. 159-164. 4 figs., 8 refs.—Description of a method based upon the fact that fast neutrons are converted into slow ones by impact with water molecules. The apparatus, consisting of radioactive source and detector, is described and illustrated.

Substantial discussions are included at the end of each Section. *Subject Headings:* 1. Soil moisture conferences 2. New Zealand.

10C-77

551.579.5:551.508.79

Organesian, A. P., **Uproshchennyi metod opredeleniia vlazhnosti pochvy.** [Simplified method for determining soil moisture.] *Pochvovedenie*, Moscow, No. 4:109-113, 1958. 1 fig., 3 tables, 9 refs. **DLC**—The "burning alcohol" method of Bouyoucos for determining soil moisture content is described and its inadequacies are summarized with particular reference to results obtained by Soviet investigators, and by the author himself. An apparatus for eliminating various defects of the burning alcohol method is described. It consists of the usual aluminum drying cup, 38 mm high with a diameter of 50 mm, on the top of which is placed a tripod covered with a metallic mesh with 0.1 mm openings. Through such a sieve, the soil does not bolt and the flame arising from drops of alcohol on the top of the cup does not pass through the sieve. The top of the cup is weighed together with the tripod, the height of which must be 1 cm above the sides of the base, so that the burning can take place in a normal access of air. With this apparatus the burning of the soil sample is more uniform, results are more exact and the time necessary for making measurements is shortened by several times. Illustrations of the Bouyoucos and of the improved apparatus are presented. *Subject Heading:* 1. Soil moisture measurement techniques.—I.L.D.

10C-78

551.579.5:712.3

Oliferov, A. N., **Opyt izucheniia vodnogo rezhima terrasirovannykh sklonov v gornom Krymu** [Study of the water-regime of the terraced slopes in the mountainous part of the Crimea.] *Pochvovedenie*, Moscow, No. 4:92-93, April 1957. table, 3 refs. English summary p. 93. **DWB, DLC**—The method of making terraces on steep slopes (up to 45°) by means of a universal bulldozer D-25 was applied in 1954 and is worth recommending for use in horticulture and forestry. The most

favorable conditions of humidity are usually found in the middle part of the terrace, which should be utilized for orchards and vineyards. The study of soil humidity in terraces of the northern and southern slopes showed that in the Crimea it is advantageous to make terraces on both the northern and the southern slopes. *Subject Headings: 1. Soil moisture conservation 2. Terracing 3. Crimea, U.S.S.R.—Author's abstract.*

10C-79

551.508.79:551.579.5

Parameswaran, S., *An apparatus for the determination of the water requirements of crops.* *Current Science*, Bangalore, 25(8):250-252, Aug. 1956. fig. DWB, DLC—Daily water losses by evapotranspiration from a well-watered Jowar (crop) plot at Poona are shown graphically for July 10-Sept. 15, 1955, and the equipment for measuring the moisture in the soil tanks (inductance-capacitance oscillator) described. It is said to agree well with actual weighing of soil to determine the residual soil moisture; and is more sensitive. The relation of water losses to crop height is shown for 5 different heights, ranging from $\frac{1}{2}$ " on July 13 to $\frac{3}{4}$ " on Sept. 15. A total of 18.38" of water was lost. *Subject Headings: 1. Soil moisture instruments 2. Electronic evapotranspirimeters 3. Evapotranspiration loss 4. Poona, India.—M.R.*

10C-80

551.573:551.579.5

Parameswaran, S., *Assimilation of moisture from ground surface into the atmosphere at the Central Agricultural Meteorological Observatory, Poona.* *Irrigation and Power*, 15(1):106-125, Jan. 1958. 3 figs., 5 tables, ref. DA (55.9 In222C)—Hourly and daily values of evaporation and condensation from the vast area of land in the vicinity of the Agricultural Meteorological Observatory, Poona, were calculated with the help of a formula designed for the purpose by measuring the gradients in temperature, humidity and wind between two heights, 2 ft and 28.6 ft and the results are presented and discussed. *Subject Headings: 1. Soil moisture evaporation 2. Moisture balance 3. Poona, India.—Author's abstract.*

10C-81

551.579.5:551.573

Parkhomenko, M. L., *Vlianie vlazhnosti pochvy na intensivnosti isparenii vlagi s ee poverkhnosti.* [The influence of soil humidity on intensity of evaporation from soil surface.] *Pochvovedenie*, Moscow, No. 5:97-99, May 1957. figs., 2 tables, 7 refs. English summary p. 99. DWB, DLC—In soil samples (in boxes) having various initial water content, the author studied the changes of soil humidity (by weighing). He found that the highest rate of evaporation takes place when the water content is close to field capacity. As the amount of water in the soil decreases, the intensity of the evaporation falls in steps. The author suggests several means for diminishing the water losses by evaporation. *Subject Heading: 1. Evaporation-soil moisture relationships.—Author's abstract.*

10C-82

551.508.79:551.579.5

Peerlkamp, P. K., *Het bodemwater in verband met de watervoorziening van de plant.* [Soil moisture and the water supply of plants.] (In: Nederlandse Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, *Verslagen Technische Bijeenkomsten*, 1-6, 1946-1950. Pub. 1952. p. 177-184. table. In Dutch. English summary p. 294. French summary p. 323.) DWB—Discusses methods of soil moisture investigations (moisture equivalent, wilting coefficient, use of soil models, energy concept). Movement of moisture in unsaturated soils is discussed in some detail. A few results are shown of an evaluation of maximum water supply in a clay soil. *Subject Heading: 1. Soil moisture measurement.—A.A.*

10C-83

551.579.5:633.11

Petunin, I. M. and Karavaeva, A. P., *Ob ispol'zovanii gidrotermicheskikh koeffitsientov dlia kharakteristiki vlagobespechennosti i urozhainosti sel'skokhoziaistvennykh kul'tur.* [Use of hydrothermal coefficients for expressing moisture reserve and yield capacity of agricultural crops.] *Moscow. Tsentral'nyi Institut Prognozov, Trudy*, No. 53:95-104, 1957. fig., 18 refs. DLC—In simple climatic classifications, the distribution of mean monthly temperature does not provide a true picture of the heat supply of plants and the distribution of precipitation does not indicate the true moisture supply. Indexes of heat supply are provided by the various methods of temperature summations (active, effective, positive). No precipitation summation is possible because of the nonuniformity of rainfall. Various moisture indices developed in Russia, including those of DOUCHAEV, IVANOV, A. V. OLSUF'EV, SELANINOV and BUDYKO, are examined critically. Of particular interest is the hydrothermal coefficient (developed by SELANINOV) which equals the ratio of rainfall summations to the summations of mean daily temperatures reduced ten times. It is concluded that, with known limitations, the hydrothermal coefficient can be used as an index of moisture supply of vegetation only for natural conditions when man does not influence natural processes. The actual application of the hydrothermal coefficient to analyze the moisture supply of spring wheat during various phases of development is illustrated, and the correlations between yield of wheat and

hydrothermal coefficient were computed for each developmental phase. The correlation coefficients were so small and the errors of the regression equation so large that this relationship cannot be employed in order to calculate wheat yield. *Subject Headings:* 1. Hydrothermal coefficients 2. Moisture index 3. Wheat yield.—I.L.D.

10C-84

551.579.5

Pfau, Rolf, Ein Beitrag zur Bodenwasserbewegung. [A contribution on ground water movements.] *Meteorologische Rundschau*, Berlin, 11(4):116-120, July/Aug. 1958. 4 tables, 6 refs. **DWB, DLC**—The vertical movement of water in soil, which accounts for the underestimation of soil moisture from the relationship $N - e$ (N —precipitation; e —evaporation), is examined on the basis of extensive measurements made since 1953 by the Neustadt/Weinstrasse Agrometeorological Station. These studies led to the assumption of ascending water which was related to cooling processes of the upper soil layer. The author examined the results of the Popov lysimeter, the reality of the balance computed from N , e and change of moisture content, Δu , calculated according to the equation $N - e - \Delta u = b$ and the causes of possible negative balances. The results of the study indicate the reality of ascending water. The amount, based on a mean of many years, corresponding to the absolute deviation θ_M (difference between the balance b and the Popov lysimeter), is around 1 mm/day for Neustadt soil and increases to 3 mm/day in individual cases. The phenomenon of ascending water is associated with soil frost periods and with periods with a U (soil water content) between PFK (pseudofield capacity) and FK (field capacity). The Popov lysimeter provides reliable water percolation values when $U \geq FK$ or $U \leq PFK$. The upward movement of soil water is suppressed—a phenomenon manifested in periods when the soil is below saturation and when the soil is frozen. During these periods the Popov lysimeter is not reliable. In the condition $PFK < U < FK$ capillary forces are active, so that water rises from lower soil layers. In the condition $U \leq FK$ the soil yields percolation water in the case of precipitation. The thermal forces modify the amount only in as far as the simultaneous cooling diminishes and warming increases the amount of percolating water. The balance over a number of years is positive in the condition $U \geq FK$. *Subject Headings:* 1. Ground water movement 2. Percolation 3. Soil moisture movement.—I.L.D.

10C-85

551.579.5

Philip, J. R. (*Commonwealth Scientific and Res. Org., Australia*), The theory of infiltration. Pt. 1, The infiltration equation and its solution. *Soil Science*, Baltimore, 83(5):345-357, May 1957. 2 figs., 2 tables, 25 refs., 41 eqs. Pt. 2, The profile at infinity. *Ibid.*, 83(6):435-448, June 1957. 7 figs., 3 refs., 52 eqs. Pt. 3, Moisture profiles and relation to experiment. *Ibid.*, 84(2):163-178, Aug. 1957. 6 figs., 18 refs., 17 eqs. Pt. 4, Sorptivity and algebraic infiltration equations. *Ibid.*, 84(3):257-264, Sept. 1957. 2 tables, 17 refs., 21 eqs. Pt. 5, The influence of the initial moisture content. *Ibid.*, 84(4):329-339, Oct. 1957. 8 figs., 2 tables, 16 refs., 12 eqs. Pt. 6, Effect of water depth over soil. *Ibid.*, 85(5):278-286, May 1958. 10 figs., 16 refs., 41 eqs. Pt. 7 (Conclusion). *Ibid.*, 85(6):333-337, June 1958. 3 figs., table, 16 refs., 12 eqs. **DLC, DA**—Despite the attention of many scientists in the last fifty years, it was only recently that the partial differential equation describing infiltration was formulated. The papers in this series present the first solutions of the equation and discuss the theory of infiltration in the light of these solutions. *Subject Headings:* 1. Infiltration theory 2. Soil moisture movement.—From author's introduction.

10C-86

551.579.5

Ponomarev, B. P., Metodika rascheta vlogoobespechennosti kartofelia v osnovnykh raionakh ego vozdel'nyaniia na Evropeiskoi territorii SSSR. [Method of calculating the moisture supply for potatoes in their main cultivation areas in the European U.S.S.R.] *Moscow. Tsentralnyi Institut Prognozov, Trudy*, No. 47(74):59-64, 1956. fig., table, 7 refs. **DLC**—A theoretical paper showing that the moisture supply of potato plants can be represented as a function of actual moisture resources (the sum of moisture reserves in the earth layer accessible to the roots at the beginning of the growing period plus precipitation) in relation to the necessary amount of moisture. Adequate moisture supply in the period of tuber formation is of primary importance. *Subject Headings:* 1. Moisture requirements of potatoes 2. Soil moisture effects on plant growth 3. European U.S.S.R.—A.M.P.

10C-87

551.579.5:631.67

Popov, O. V., O prosachivanii dozhdevoi vody v pochvo-grunty i metodike ego izucheniia. [Infiltration of rainwater into the ground and methods of its investigation.] *Leningrad. Gosudarstvennyi Gidrologicheskii Institut, Trudy*, No. 54:92-118, 1956. 4 figs., 41 refs., 6 eqs. **DLC**—In this detailed study of the problem, the author takes up the mechanism of rain water infiltration (gravitational or drop-liquid penetration, capillary infiltration and "free" or film infiltration) into the soil, and its further penetration down to the ground water through various layers of soil; he discusses the mechanical composition and permeability of various soil types; he examines next the existing theories and methods of computing the intensity of water infiltration into soils, and discusses

the best methods of artificial moistening of soils in field conditions (flooding or sprinkling) for the study of water infiltration on the spot, and indicates how to obtain the best results in such field investigations. *Subject Headings:* 1. Irrigation 2. Soil moisture movement 3. Infiltration.—A.M.P.

10C-88

551.579.5:631.62

Pustovoitov, N. D., *Fizicheskie svoistva i vodno-vozdushnyi rezhim pochv iugo-zapadnoi chasti Zeiskoi-Bureiskoi ravniny*. [Physical properties and hydro-aeration regime of soils of the southwestern part of the Zeya-Bureya plain.] *Pochvovedenie*, Moscow, No. 6:43-55, 1957. 3 figs., 5 tables, 11 refs. English summary p. 55. **DLC**—The study of the physical properties and of the hydro-aeration regime of the soils in the southwestern part of the Zeya-Bureya plain showed that the slightly undulated relief, the heavy mechanical composition of soil forming bed rocks and the lengthy seasonal freezing lead to the formation of high ground water level. This led to the formation of complex clayey soils with structureless subarable horizons and negative hydro-physical properties. Under these conditions the unstable annual precipitation, which is observed in the Amur region, and its irregular seasonal distribution create difficulties in agriculture which are connected both with over-moistening and droughts. The removal of these obstacles depends on meliorative measures: improvement of hydro-physical properties of soils and drainage. *Subject Headings:* 1. Soil moisture variations 2. Drainage 3. Weather effects on soil moisture 4. Zeya-Bureya plain, U.S.S.R.—*Author's abstract.*

10C-89

551.579.5

Ramdas, L. A. (*Met. Office, Poona*), *The movement of moisture through the soil*. (In: India. Central Board of Geophysics, *Proceedings of the Symposium on Ground Water, New Delhi, Feb. 1955*, pub. Calcutta, 1958. p. 146-160. 8 figs., 4 tables, 29 refs.) **DWB**—Upward and downward movements of water delivered as sub-soil irrigation near the root zone were investigated at Poona, India, under laboratory conditions. Preliminary results are presented on such water movements as affected by soil type, soil packing, and salt content. Experiments with soil evaporimeters to determine effects of the water table level upon evaporation are also reported. *Subject Heading:* 1. Soil moisture movement.—G.T.

10C-90

551.5:63

Ramsauer, B. (*Vienna*), *Agrarmeteorologie und Kulturtechnik*. [Agrometeorology and cultivation methods.] *Wetter und Leben*, Vienna, 7(8/11):236-240, 1955. 4 refs., eqs. **DLC**—The author discusses the soil moisture regime, including the determination of optimal soil moisture conditions for plant growth, soil dew, soil temperatures, precipitation and atmospheric dew, evaporation, wind intensity and direction, and drainage measurements in relation to cultivation procedures. An example of determining the mean values of some of the elements is presented. *Subject Headings:* 1. Agricultural meteorology 2. Soil moisture.—I.L.D.

10C-91

551.579.5

*Rasmussen, P., *Van balance, meteorologiske og jord bundsfysiske målinger i frugtplantage ved forskellige kulturmetoder*. [Water balance, meteorological and soil physical measurements in an orchard with different methods of cultivation.] *Tidsskrift for Planteavl*, Copenhagen, 61(1):49-102, 1957. English summary. 18 figs., 4 tables, refs. **DA** (11 T439)—Data obtained from spring 1953 to fall 1954 at the Blangstedgaard State Research Station are reported. The elements measured were atmospheric temperature, wind speed, relative humidity, hours of sunshine (recorded at Aarslev), and soil temperature and moisture at 25, 50, 100 and 150 cm below surface. The measurements were made and are presented on a comparative basis for bare soil and mulch and short grass cover. Calculated evaporation values are also presented. The soil moisture measurements were made both with tensiometers and gypsum blocks. *Subject Headings:* 1. Soil moisture data 2. Weather effects on soil moisture.—G.T.

10C-92

551.579.5

Raspopov, M. P., *Voprosy vlogooborota v pochvo-gruntakh Severo-Zapadnoi chasti Prikaspiiskoi Nizmennosti*. [Moisture exchange in the soils and subsoils of the northwestern part of the Caspian Depression.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 86(2):149-155, March/April 1954. 3 tables. **DLC**—The relationship between the moisture regime of the soil and the ground water of the Caspian Depression and the microrelief with its associated soils and vegetation are analyzed. The various horizons of the moisture exchange zones (zones of aeration) are described and their moisture regimes are analyzed in relation to their structure, the microrelief, rain and snow accumulation. Also, the moisture regime of the various soil types and the influence of shelter belts are considered. *Subject Headings:* 1. Soil moisture 2. Ground water 3. Soil types 4. Shelter belt effects on soil moisture.—I.L.D.

10C-93

551.579.59:633.11

Razumova, L. A. and Mel'nik, Iu. S., *Usloviia vodosnabzheniia iarovoi pshenitsy pri osnovnykh sposobakh ee vozdel'yvaniia v stepnykh raionakh Kazakhstana*. [Water supply conditions of summer wheat in relation to the principal methods of its cultivation in the steppe regions of Kazakhstan.] *Meteorologiya i Gidrologiya*, Leningrad, No. 3:15-24, March 1957. 4 figs., table, 3 refs. **DWB, DLC**—This study of the characteristics of the formation of water reserves in the soil during the period preceding sowing and the consumption of moisture during the growth period was carried out on fields cultivated by different methods. Both graphical and numeric data are presented on the dynamics of reverses of productive moisture in 10 cm layers of soil for cultivation with disk plows and with moldboard; the conditions of water supply for summer wheat sown after soil was fallow, after spring wheat, perennial crops, etc.; water supply on summer wheat fields cultivated by different methods, etc. *Subject Headings*: 1. Soil moisture requirements 2. Water supply for wheat 3. Soil moisture data 4. Kazakh SSR.—*I.L.D.*

10C-94

551.508.79:551.579.5

Remsen, Irwin and Fox, G. S. (*U. S. Geological Survey, Seabrook Farms, N. J.*), **Displacement of calibration curves for electrical soil-moisture units**. *American Geophysical Union, Transactions*, 36(5):821-826, Oct. 1955. fig., 2 tables, 11 refs. **DWB, DLC**. Also: Dreibebis, F. R. and Remsen, Irwin, [Discussion]. *Ibid.*, 37(4):497-498, Aug. 1956. 2 figs., 14 refs. **DWB, DLC, NRL, DGL**—In the first paper, electrical-resistance blocks were calibrated for use in soil moisture studies at Seabrook, N. J. Curves from successive laboratory calibrations are positioned differently because of the effects of chemical quality of the water used, drying techniques, and other factors. Furthermore, the laboratory curves are displaced from the field calibration curves because of the difficulty of establishing moisture equilibrium in laboratory samples. It is believed that the results demonstrate the general unreliability of laboratory calibrations when compared with field calibrations of soil-moisture blocks. In the second paper, the authors point out that good agreement is obtained when laboratory calibrations are compared with field sampling on the Keeve silt loam and on the muskingum silt loam; this agreement between field and laboratory calibration of fiberglass-gypsum blocks on Keeve silt soil is shown on a diagram. **REMSEN** replies that the error mentioned above was caused by error which "translated the field calibration curves for the Seabrook soil-moisture units, farther to the right than they should have been, and caused the large moisture contents," and admits that his technique with the Seabrook soils was largely responsible for the lack of agreement between laboratory and field series. There is also some displacement in this series as a result of hysteresis. *Subject Headings*: 1. Soil moisture instrument calibration 2. Electric soil moisture instruments.—*Authors' abstract and I.L.D.*

10C-95

551.579.5:633.491

Rinno, G., *Der Anbau von Winterzwischenerfrüchten in seiner Auswirkung auf die Wasserversorgung und den Ertrag von Kartoffeln*. [The cultivation of winter plants and its influence upon water content and potato yield.] *Zeitschrift für Acker- und Pflanzenbau*, Berlin, 105(3):289-300, March 1958. 7 figs., 4 tables, 13 refs. **DLC**—From 1952 until 1955 a study was made of the water content of land under potatoes following on green manuring and fallow. Although, in some years, green manuring had an adverse effect on local water content extending into July, there was no noticeable effect from it on potato yield. With one exception, potato yields were higher on the green manured plots than on the fallow plots. The annual rainfalls for the period were higher than the long-time average. Nevertheless, the distribution in 1953 and 1954 was very unfavorable directly in relation to the matter investigated in this research. *Subject Headings*: 1. Soil moisture 2. Green manure effect on water content 3. Potato crop yield.—*Author's abstract.*

10C-96

551.579.5:551.58:631.67

Robertson, George W. (*Meteorologist, Dept. of Agric., Ottawa, Canada*), **The use of climatic data in irrigation planning**. *Canadian Society of Agronomy, 2nd Annual Meeting, Univ. of Toronto, June 25-28, 1956, Proceedings, Sec. C*, p. 31-36. 7 tables, 2 refs. **DA?**—Soil moisture budget calculations are demonstrated, supplemental irrigation requirements for various risks of drought, soil moisture storage capacities for 15% drought risk and risk of daily water use by a crop, probability of July surplus of moisture > one inch soil storage capacity, and other analysis of climatic data are illustrated in tabular form to show how past weather records can be used in planning and organizing farm or irrigation work. Risk tables are said to be far more valuable than averages (which represent 50% risk). *Subject Headings*: 1. Climatic data use in irrigation 2. Irrigation calculations 3. Risk tables.—*M.R.*

10C-97

551.579.5(02)

*†Rode, A. A., *Pochvennaia vlaga*. [Soil moisture.] Moscow, Akademiia Nauk SSSR, 1952. 456 p. 108 figs., 143 tables, bibliog. p. 446-455. **DLC** (S594.R6). Also: Discussion by S. I.

Dolgov. *Pochvovedenie*, No. 11:56-65, Nov. 1954. 2 refs., 2 figs. **DLC**—A large systematic textbook covering the entire subject of soil moisture from a theoretical and practical standpoint in 9 ch.: I. Soil porosity, and physical characteristics of soil with respect to water; II. Water, its physical properties, osmosis, capillary action, capillary condensation; III. Water vapor and the solid state of soils; hygroscopticity, ability to absorb moisture from air; IV. Water bound in the soil (not free) and amounts observed empirically; V. Suspended moisture in soils or the earth and factors which control them, examples from full measurements; VI. Gravitational movement of moisture, capillary use of moisture against gravitational forces; VII. Drying power of soils; VIII. Soil moisture and growth of drops or plant growth; IX. Forms of soil moisture, their characteristics and occurrence in different soil types. An excellent bibliography of >350 articles, about $\frac{1}{3}$ from non-Russian sources, is appended. The text is full of illustrative tables of data and graphs or diagrams showing results of field or laboratory experiments with soils, moisture and plants. Important conclusions are summarized at the end of each chapter. Theory and principles are illustrated by schematic diagrams. *Subject Headings*: 1. Soil moisture textbooks 2. Soil moisture bibliographies.—M.R.

10C-98

551.579.5

Rode, A. A., *Vodnye svoistva pochv i gruntov*. [Hydrologic properties of soils and earth.] Moscow, Akademiia Nauk SSSR, 1955. 129 p. 42 figs., 11 tables, 10 refs. (*Nauchno-Populiarnaiia Seriia*.) **DLC** (S594.R62)—Much of this booklet is a popular presentation of material which was included in the author's more extensive work published in 1952 (see preceding item). *Subject Heading*: 1. Soil moisture.—G.T.

10C-99

551.579.5

†Rode, A. A., *Razvitie ucheniia o pochvennoi vlage v SSSR*. [Development of soil moisture research in the U.S.S.R.] *Pochvovedenie*, Moscow, No. 10:1-15, Oct. 1957. 130 refs. **DWB**, **DLC**—Successes achieved by the science of soil moisture during the last 40 years are reviewed. Information on the water regime of various soil types has been accumulated which made it possible to solve a number of problems concerning agricultural engineering, irrigation, field-protecting afforestation, drought prevention, forest management, construction of large-scale hydro technical structures, etc. Knowledge of the water properties of soil and their nature has been considerably extended. The phenomena of sorption of moisture by soil, properties of suspended moisture, capillary phenomena and gravitational movements of moisture, have been investigated and attempts were made to elucidate their interrelationship. Works on general problems of soil hydrology, on the water regime of individual soil types under various vegetative covers, on the effect of cultivation methods on soil moisture and the water regime, as well as handbooks on water and other physical properties of the soil, have been published. *Subject Headings*: 1. Soil moisture research 2. U.S.S.R.—A.M.P.

10C-100

551.555.9:551.579.5:551.573

Rusin, N. P., *Isparenie i teplovoi balans pri sukhoveiakh*. [Evaporation and thermal balance during dry winds.] (In: Akademiia Nauk SSSR. Institut Geografii, *Sukhovei ikh proiskhozhdenie i bor'ba s nimi*. Moscow, 1957. p. 248-266. 6 figs., 6 tables, 6 refs., 5 eqs.) **DLC** (QC940.R9A6)—Methods and results of an investigation of evaporation from the soil and of the thermal balance, carried out by a joint expedition of the main Geophysical Observatory and of the State Hydrological Institute at Dubov (near Salsk, Rostov Oblast) during the 1953 vegetation period, are presented. It has been shown that the drying effect of dry winds—in the presence of identical combinations of temperature, air moisture, and wind speeds—depends on the moisture content in the soil, and can be evaluated by the daily sums of evaporation or the transpiration deficiency. Dry winds become more injurious when they pass over soil with a low moisture content. In changing the correlation of the thermal balance components by means of irrigation, it is possible to reduce the turbulence and the temperatures of air and soil. *Subject Headings*: 1. Sukhovei effects on evaporation 2. Soil moisture effects on evaporation 3. Salsk, U.S.S.R.—A.M.P.

10C-101

551.579.5

Rutkovskaia, V. A., *Opyt izucheniia fil'tratsii vody v podpochvennom valunnom suglinke*. [Experiments for study of water infiltration in glaciated clayey subsoil.] *Pochvovedenie*, Moscow, No. 1:42-49, 1953. fig., 4 tables, 2 refs. **DLC**—Infiltration coefficients are determined for three meadows and one forest monolith. *Subject Headings*: 1. Soil moisture 2. Infiltration.—A.A.

10C-102

551.577.38 551.573:551.579.5

Savina, S. S., *Gidrometeorologicheskii pokazatel' zasukhi*. [Hydrometeorological index of drought.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No. 4:21-28, July/Aug. 1957. 10 refs., 5 figs., table, 3 eqs. **DWB**—An attempt is made to develop an index of drought valid for any area and any period of time. By means of experimentally obtained data on evaporation from fields of

winter wheat, rice and beets and the equation of evaporation

$$E = \frac{(R-B)De}{0.6^{-4}Dt + De'}$$

(E —evaporation in mm/hour, R —radiation balance in cal/cm²/min, B —heat exchange in the soil in cal/cm²/min, De —difference of water vapor tension between two heights in mb), it is shown that actual evaporation and potential evaporation are equal when these fields contain adequate amounts of soil moisture. The relationship of actual evaporation to amount of soil moisture in the case of soil moisture deficiency, is analyzed with the aid of agrometeorological observations obtained at stations in the Chkalov and Kuibyshev Oblasts during 1945–1954, and it is shown that the E/E_0 (ratio of evaporation to potential evaporation) is a linear function of soil moisture, $E/E_0 = bW$, where $b = 0.1$ (W —soil moisture). When the soil moisture is adequate, the index of moisture equals unity, without dependence upon potential evaporation; in case of inadequate moisture, the index of moisture is proportional to the active moisture of the root zone of the soil, so that the moisture index takes meteorological factors into account only indirectly through soil moisture. The equation of evaporation deficit $\Delta E = E_0 - E_0bW = E_0(1 - bW)$ is developed; its use as an index of drought is illustrated, and its advantage over other drought indices is discussed with the actual data relating plant damage to moisture deficit. *Subject Headings:* 1. Drought index 2. Evaporation-soil moisture relationships.—I.L.D.

10C-103

551.508.79:551.579.5

Schnelle, Fritz (German Weather Bureau, Bad Kissingen), *Überwachung des Wasserhaushaltes des Bodens durch den deutschen Wetterdienst in der US-Zone*. [Survey of the water economy of the soil by the German Weather Bureau in the U. S. Zone.] *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et Discussion*, pub. 1953. p. 300–302. DWB—General report on the current observational program, employing mainly improved Popov lysimeters. A large lysimeter is built at the agrometeorological research station at Giessen. *Subject Headings:* 1. Soil moisture measurement techniques 2. Popov lysimeter 3. Germany.—A.A.

10C-104

551.508.72:551.579.5

Schofield, R. K. (Great Britain), *Infiltration (absorption by the soil), factors which determine the degree of infiltration of the rainfall, taking into account the effect of plants, the configuration of the soil, etc. and the importance of these influences*. *I.U.G.G. International Association of Scientific Hydrology, Oslo, 1948, [Transactions]*, 3:40–43, [1950?] fig., 6 refs. DWB—Report on some results of measurements made at Rothamsted with evaporation tanks (water surface, bare soil, grass cover, different water levels). All surfaces respond in the same way to weather conditions. Using fertilizers, it was found that transpiration is not closely related to rate of growth. Some remarks are made on the computation of soil moisture deficit. *Subject Headings:* 1. Evaporimeters 2. Transpiration 3. Soil moisture 4. Rothamsted, Great Britain.—A.A.

10C-105

551.573:551.48(777)

†Shaw, Robert H. (Prof. Agri. Climatology, Iowa State College), *Comparison of methods of estimating evaporation from small water surfaces in Iowa*. Submitted Aug. 9, 1957 to the U. S. Weather Bureau in compliance with Memorandum of Understanding, Cwb-8808, May 1956. 45 p. 21 figs., 8 tables, 25 refs. Carbon of typescript. DWB (M73 S535co)—Small pond evaporation, as measured by three of the multiple methods existing, is discussed in relation to degree of effectivity. The study involves a review of literature, relationship of evaporation and evapotranspiration, evaporation from pan vs. pond and soil moisture data. The results are presented in graphs and tables. *Subject Headings:* 1. Evaporation from small water surfaces 2. Evaporation estimation 3. Iowa. I. Contract Cwb-8808.—W.N.

10C-106

551.579.5(777)

*Shaw, R. H.; Runkles, J. R. and Barger, G. L., *Seasonal changes in soil moisture as related to rainfall, soil type and crop growth*. Iowa. Agricultural Experiment Station, Research Bulletin, 457:223–239, Feb. 1958. 20 figs., 12 tables. DA (100 109)—Soil moisture data were obtained in Iowa in a state-wide sampling program in 1954–1956. Monthly values of available soil moisture (0–5 ft) and corresponding precipitation and water loss data (runoff, evapotranspiration and percolation) are presented. Effects of corn and grass cover, and relation between corn field and water use are considered. *Subject Headings:* 1. Soil moisture variations 2. Iowa.—G.T.

10C-107

551.579.5:551.578.46

*Shulgin, A. M., *Pochvennyy klimat i snegozaderzhanie*. [Soil climate and snow retention.] Moscow, Akademiia Nauk SSSR, 1954. 105 p. 31 figs., 40 tables, 50 refs. (*Nauchno-Populiarnaya Seriya*). DLC (S594.5.S5)—Physical properties of snow and of different soils are described and the

effects of snow on soil temperature are considered. Methods of snow retention are discussed and data are presented, showing the influence of such snow retention upon the soil climates, including soil moisture. *Subject Headings:* 1. Snow retention effects on soil moisture 2. Snow cover effects on soil temperature.—G.T.

10C-108

551.579.5

*Staprens, V. Ia., *Migratsiia kapilliarno-sviazannoī vlagi v zone aeratsii*. [Migration of moisture bound by capillarity in the aerated region.] Riga, Akademiia Nauk Latvīskoī SSR, 1955. 144 p. 9 figs., 133 tables, 29 refs., eqs. At head of title-page: Akademiia Nauk Latvīskoī SSR, Institut Geologii i Poleznykh Iskopaemykh. **DLC** (S594.S774)—The principal subject of this book is the formation and migration of water in the soil. It is based on experiments made with different types of soils under laboratory conditions. Data are presented in tabular and graphical form on soil moisture variations with depth and time as functions of moisture amount, hydraulic pressure, and soil type. As a result of the experiments, the conditions under which water is retained in the soil in capillary suspension, and the different mechanisms whereby such suspended water migrates are described. *Subject Headings:* 1. Soil moisture variations with depth 2. Water retention.—G.T.

10C-109

551.579.5:551.585.55

Struzer, L. R., *Rezultaty issledovaniia vodnogo rezhima glubokikh sloev pochv i gruntov v Salskikh stepiakh*. [Results of studies on the water regime of the deep layers of soil and ground in the Salsk steppes.] *Pochvovedenie*, Moscow, No. 4:86-91, April 1957. 2 figs., 3 tables, 2 refs. English summary p. 91. **DWB, DLC**—Observations carried out in the Salsk steppes showed that under the conditions of low water content in a 10 m layer of soil the water may move within it both as film-water and in the form of vapor. During 36 days of the experiment the upper 3 m thick layer was losing its water, while the lower 3-10 m layer was gaining it. The mechanics of the process of movement of considerable amounts of water in soil and ground layers is yet not quite clear. It is necessary to continue the research in this sphere in the near future. *Subject Headings:* 1. Soil moisture movement 2. Salsk, U.S.S.R.—*Author's abstract*.

10C-110

551.584.4:551.579.5:633.15

*Sudakevich, E., *Mikroklimat kukuruznogo polia*. [Microclimate of a maize field.] *Meteorologiya i Gidrologiya*, Leningrad, No. 6:29-31, June 1958. 5 tables, eq. **DWB, DLC**—The microclimatic characteristics in a stubble field were investigated at the Chisminsk Agrometeorological station in 1956 and 1957, by using the late maturing maize variety Sterling, which produces a tall and dense green mass but does not always produce mature cobs in Bashkiriia, and a local average maturing variety Chishlinskaia III. Measurements of minimum and maximum temperature were made at the level of the top of the plants, at a level half the height of the plants and at soil level (2 cm), and on soil moisture and soil temperature at a depth of 10 cm. Also phenological observations and decadal determinations of soil moisture content were made. The observations were compared with those recorded in an instrument shelter and with a soil thermometer at a depth of 10 cm located in a control field. Data are presented on the meteorological conditions during the observation period (June 1-Sept. 20), supplies of productive moisture in the meter layer of the soil in maize fields, mean height and weight of one plant during ripening period, maximum, minimum and mean temperature totals in the instrument shelter and for each maize variety, and the mean deviation of the soil temperature under the maize at a depth of 10 cm from the values of the Savinov thermometer in the control field. The sums of maximum temperature in the stubble field always exceeded those in the instrument shelter; the sums of the minimum temperatures were always less than those in the instrument shelter. In the less dense variety, Chishlinskaia III, the difference was more marked than in Sterling. The temperature sums of the plants approach those in the shelter with increasing density of the green mass. The relative humidity in the green stubble at the middle of the plant height exceeds that in the shelter by 6-7% (during daylight). A small negative deviation of soil temperature at a depth of 10 cm from that measured at the weather station was always observed in the morning, this deviation increased during the day and attained a maximum during the evening. *Subject Headings:* 1. Soil climates 2. Soil moisture data 3. Soil temperature data 4. Field microclimatology.—I.L.D.

10C-111

551.579.5

*Szabó, László, *A felszíni talajréteg nedvességtartalmának jellemzése a megelőző időszak átlagértékével*. [Moisture content of the soil surface layer as derived from previous moisture load.] *Hidrologiai Közlemény*, Budapest, 37(3):264-274, 1957. 7 figs., tables, eqs. Russian and English summaries p. 273-274. **DWB**—Measurements of soil moisture, snow cover, precipitation, air temperature, wind speed, relative humidity and cloudiness made at Gödöllő during the winter 1954/55 are presented. Several formulas for estimating soil moisture from preceding precipitation and snowmelt data are tested against these measured values. *Subject Headings:* 1. Soil moisture

estimation 2. Snowmelt effects on soil moisture 3. Weather effects on soil moisture 4. Gödöllő, Hungary.—G.T.

10C-112

551.579.5(478)

Taichinov, S. N. and Faizulin, M. M., *Dinamika vlazhnosti pochvy po elementam rel'efa.* [The dynamics of soil moisture according to topographic elements.] *Pochvovedenie*, Moscow, No. 10:46-52, Oct. 1958. 5 tables, 3 refs. **DLC**—In Bashkir A.S.S.R., topography (three-fourths of the arable land is situated on slopes of different steepness) and the prevailing southeasterly wind in winter are the most important factors of the redistribution of snow on the earth's surface. The uneven distribution of snow and depth of soil freezing as regards to exposition and topography elements create different conditions of snow melting and soil thawing in spring. The irregularity of the thawing process is the cause of uneven utilization of winter precipitation by the soil, so, 68-100% of the melted water is absorbed on the northern slopes, as against 32-83% on the southern slopes. On a slope the largest amount of moisture reserve is formed in the lower part, and the smallest in the middle of the slope. The study was carried out in 1951-1953 on a representative section of the Bashkir Agricultural Institute farmlands. *Subject Headings:* 1. Soil moisture dynamics 2. Topographic effects on soil moisture 3. Bashkir A.S.S.R.—A.M.P.

10C-113

551.579.5:532.6

Takagi, Shunsuke (*Tokyo Univ. of Agri. & Tech., Fuchu-machi, Tokyo, Japan*), *Theory of the formation of bubbles.* *Journal of Applied Physics*, N. Y., 24(12):1453-1462, Dec. 1953. 12 figs., 9 tables, 19 foot-refs., 58 eqs. **DWB**—A perfect theory of bubble formation has not yet been obtained. In this paper the perfect theory of the formation of bubbles in the case where the bubbles of vapor are nucleated spontaneously in pure liquid is presented. This is done by the systematization of the classical theory of M. VOLMER (*Kinetik der Phasenbildung*, 1939) and the theory of D. TURNBULL and J. C. FISHER (*J. Chem. Phys.* 17, 71, 1949) and it coincides satisfactorily with the experiment of K. L. WISMER (*J. Phys. Chem.* 26, 301, 1922). The theory must be advanced further so as to afford a perfect explanation of the processes of boiling, cavitation and the critical phenomena of the movement of soil moisture [S. TAKAGI, *Monographs on Theoretical Soil Physics; Theoretical Considerations on the Thermodynamical and Kinematic Properties of Soil Moisture* (not yet published)]. To effect this object, the author has calculated the rate of formation of bubbles at a surface. The theoretical value, however, of the negative pressure at which the liquid fractures does not coincide by any means with the atmospheric pressure in the process of boiling. This is true also in the process of cavitation and in the process of critical phenomena of the movement of soil moisture. Some other factors must be introduced in order to bring the theory to a state of practical value. *Subject Headings:* 1. Bubble formation 2. Soil moisture evaporation.—*Author's abstract.*

10C-114

551.579.5

Taylor, Sterling A. (*Utah State Univ.*), *The activity of water in soils.* *Soil Science*, Baltimore, 86(2):83-90, Aug. 1958. 3 figs., table, 11 refs. **DLC**—The activity of water in soils is observed by determining the following: 1) The influence of pressure on absolute activity of water; 2) The influence of temp. on absolute activity of water; 3) the activity coefficient; and 4) measuring the activity of water in the soil system. The results of these experimental applications are treated in tables and graphs, showing the relative activity of soil water in cases where Wasatch coarse sandy loam, Benjamin Silty Clay loam and Oxford clay subsoil were used. *Subject Heading:* 1. Soil moisture variations.—R.P.

10C-115

551.508.79:551.579.5

Thames, John L. (*Southern Forest Experiment Station, U. S. Forest Service*), *Hydraulic inserter for soil-moisture units.* *Soil Science*, Baltimore, 86(3):156-159, Sept. 1958. 3 figs., 2 refs. **DLC**—With accompanying figures and diagrams, the author describes in detail a more versatile hydraulic moisture-unit inserter which was tested and found to work equally well in a variety of soils, including loose sandy soils, heavy clay soils, and cemented Coastal Plains Parent material. A principal feature of the inserter is a self-adjusting arrangement that permits its use in any hole between $5\frac{1}{4}$ and 7 in. in diameter. It also compensates for any backward movement of the inserter during installation, allowing the unit to be firmly held and guided until it is installed flush with the auger hole. The even hydraulic pressure applied to the unit for a modified jack thus minimizes soil disturbance. *Subject Heading:* 1. Soil moisture instruments.—R.P.

10C-116

625.7:631.4:551.579.5

Thornthwaite, Charles W., *Introduction to [Estimating soil tractionability from climate data].* *Johns Hopkins Univ. Laboratory of Climatology, Publications in Climatology*, 7(3):371-375, 1954. 8 refs. **DWB**—Underlying policy in proceeding with research on soil trafficability is outlined and the general method of approval is described. Soil moisture is computed from precipitation and

vapotranspiration in form of a bookkeeping procedure. The term topoclimatology, as a combination of micrometeorology, geomorphology, pedology and hydrology is explained. *Subject Headings:* 1. Soil trafficability 2. Soil moisture 3. Topoclimatology.—A.A.

10C-117

551.579.5:581.11

Tsel'niker, Iu. L., *Vliianie vlazhnosti obyknovennogo chernozema na transpiratsiiu drevesnykh porod*. [Influence of water content of ordinary chernozem upon transpiration of tree plants.] *Otkrytoye vozrozhdeniye*, Moscow, No. 5:54-62, May 1957. 3 figs., 2 tables, 33 refs. **DWB, DLC**—The determination of transpiration intensity carried out at the Derkul'siz field protection forest station (Voroshilovsk Oblast) during 1950-1955 by the method of quick weighing showed that the transpiration of trees is in close dependence on soil humidity in the 2 m soil depth. This correlation ratio varies between .67-.77. The curve expressing this dependence consists of 3 sections. The influence of air temperature on transpiration at above 28°C is such that it suppresses transpiration; optimum temperature for transpiration is 18°C. *Subject Heading:* 1. Transpiration-soil moisture relationships.—A.M.P.

10C-118

551.5(06)

Ubell, K. (*Res. Inst. for Water Resources, Hungary*), *Water-balance of sand-plateau between the rivers Danube and Tisza*. *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Toronto, Sept. 1957, [Transactions], Vol. 3, pub. 1958.* p. 452-461. 5 figs., 2 tables, 6 eqs. **DWB (M(06) I611g)**—At a research station of 1.0 km² area on a sand plateau between the Danube and Tisza Rivers, continuous observations have been made for six yrs to find out the interannual variations of water balance. Observation method has been considerably facilitated by the fact that runoff and subterranean flow-off practically do not exist—which characterizes the greatest part of the plateau. Monthly variations of water balance are therefore characterized by only five factors. Three of them, i.e., precipitation, surface and groundwater storage have been determined by direct observations, and two factors remain unknown, i.e., evaporation and variation of soil-moisture by computation. In computing, the relation of precipitation-total to rising of groundwater-table in winter has been considered, from which free pore-volume of soil and evaporation-total of winter can be derived. For estimation of evaporation, evaporating-capacity of air has been determined by measuring evaporation of unit (1 m²-s) water-surface. *Subject Headings:* 1. Hydrologic cycle 2. Water balance variations 3. Danube-Tisza River Valleys.—Author's abstract.

10C-119

551.508.79:551.579.5

†Uhlig, S., *Acht Jahre Bodenfeuchte-Bestimmungen des Deutschen Wetterdienstes*. [Eight years of soil moisture determinations by the German Weather Service.] *Meteorologische Rundschau*, Berlin, 10(5):163-170, Sept./Oct. 1957. 6 figs., 48 refs. **DWB, DLC**—The author reviews the results of 8 yrs of measurements of soil moisture carried out by the soil moisture network in West Germany, and also the literature on this subject. The various procedures for determining soil moisture content are described, these are the desiccation method, electrical resistance method, the neutron scattering method, etc. and relative values of expressing soil moisture content in weight and volume percent are considered. Owing to the dependence of soil moisture relationships upon soil type, regional comparisons of soil moisture content must be based on relative measure of soil moisture. Such relative measures are the exhaustible soil moisture content, "water available to plants," field capacity, etc. The results of measurements are given in graphs which show the annual variation (for each year 1949-1956) of soil moisture at 0-50 cm depth, the penetration depth of precipitation for different soil moisture contents and calculated (from climatological values) measured variation of soil moisture in a winter rye field. A discussion is given of soil moisture in frozen soils, storage capacity of various soil types, mean annual variation of exhaustible soil moisture content, calculation of evaporation of soil water with the aid of soil moisture measurements, penetration of precipitation into the soil and the calculation of soil moisture variation by means of climatological values with special reference to THORNTWALP's method. *Subject Headings:* 1. Soil moisture measurement techniques 2. Soil moisture variations.—I.L.D.

10C-120

551.577.38:551.571.1(758)

*Van Bavel, C. H. M. and Carreker, John R., *Agricultural drought in Georgia*. *Georgia. Agricultural Experiment Stations, Technical Bulletin, n.s.*, No. 15, Dec. 1957. 41 p. 34 figs., 5 tables, 10 refs. **DWB (M77.38 V218ag)**—VAN BAVEL's (1953) method of estimating drought is applied to estimation of agricultural drought (a deficiency of water to roots of plant) in Georgia. Maps show areas and intensities or frequencies of drought in the 6 sectors of Georgia used in the treatment. Daily moisture balance data were computed by IBM machines for 32 stations for 8 months (March-Oct.) and for 25 yrs (1930-54). Monthly and annual sequences and duration of sequences, rainfall, evapotranspiration, available soil moisture, and moisture requirement of plant were the 4 parameters

considered. PENMAN's method was used to estimate evapotranspiration, and since only 4 stations in Georgia had all the required data for such computations (radiation, sunshine, temperature, wind speed), it necessitated a division of the state into 4 areas of homogenous evapotranspiration. Probability maps show number of drought days with 1", 2" and 3" of moisture available in the soil; 1, 2, 3, and 5 yrs out of 10, respectively. It can be seen that drought is quite common in Georgia. Curves or nomograms show probabilities also for different criteria and for 6 stations. Minimum water requirements for various sectors of the state are also shown on maps. *Subject Headings: 1. Drought in Georgia 2. Moisture balance 3. Georgia.—M.R.*

10C-121

551.579.5:631.67

Van Bavel, C. H. M. (*U. S. Dept. of Agriculture and N. C. State Coll.*), **Use of climatic data in guiding water management of the farm.** [1958]. 14 p: 2 figs., 16 refs. Reproduced from typescript. "Prepared for AAAS, Section O-Agriculture, program on 'Water and Agriculture,' Washington, D. C., Dec. 29-30, 1958."—A method is described for determining frequency distributions of drought incidence from data on: 1) rate of evaporation, 2) soil moisture storage capacity, 3) precipitation amount and 4) precipitation distribution. A sample daily soil moisture balance diagram prepared by this method, and a map of the southeastern States showing minimum amounts of supplemental water needed per season in the driest year out of ten, are presented. *Subject Headings: 1. Soil moisture requirement 2. Irrigation 3. Southeastern United States.—G.T.*

10C-122

551.508.79:551.579.5

van Eimern, J., **Über eine Feldmethode zur Bestimmung des natürlichen Wassergehaltes des Bodens.** [On a field method of determining the natural water content of the soil.] *Meteorologische Rundschau*, 7(3-4):66-67, March-April 1954. DWB—The method, slightly modified from that devised by R. KÖHLER in 1951, uses two metal cylinders of different sizes, one within the other. A weighed core of soil is placed inside the smaller cylinder, spirit is poured through and set alight; when dry it is weighed again. *Subject Heading: 1. Soil moisture instruments.—C.E.P.B.*

10C-123

551.579.5

van't Woudt, Bessel D. (*Soil Res. Station, Dept. of Agric., Rukuhia, Hamilton, N. Z.*), **On factors governing subsurface storm flow in volcanic ash soils, New Zealand.** *American Geophysical Union, Transactions*, 35(1):136-144, Feb. 1954. 4 figs., 5 tables, 4 refs. MH-BH—The possible occurrence of subsurface storm flow in volcanic-ash soils was investigated by means of small lysimeters with and without window openings to measure lateral flow. The information obtained from lysimeters led to a further investigation of apparently aberrant results by a number of experimental methods largely devised under field conditions. The results obtained from these experiments show that (1) a resistance of wetting exhibited by the surface soil at a low moisture content, (2) a low permeability of the B horizon compared with that of the A horizon, apparently related to an initial anisotropy in the ash beds, and (3) the transition from a line to a coarse-textured layer cause a lateral flow through the surface soil on sloping ground to take place during rain storms. The magnitude of this flow largely depends on the intensity of a rain storm. *Subject Headings: 1. Permeability 2. Soil moisture effects on infiltration.—Author's abstract.*

10C-124

551.579.5:551.573

†Vasil'ev, I. S., **Vodnyĭ rezhim podzolistykh pochv.** [Water regime of podzolic soils.] *Akademii Nauk, SSSR. Pochvennyiĭ Institut, Trudy*, 32:74-296, 1950. figs., tables, refs. p. 293-297. DLC (QE1.A35)—Report on studies made on experimental plots from 1937-1941 within a forest and on an adjacent field in the district of Velikie Luki, is presented in extreme detail. Data included a survey of soils and duff and their mechanical and chemical properties, survey of plants, soil profiles, soil moisture profiles (mean standard deviation etc.), capillary and total moisture capacity, wilting point, percolation coefficients, meteorological conditions (air and soil temperature, precipitation, snow cover, depth of freezing, thawing of the soil), compared with soil moisture and soil air by means of chronoisopleths, ground water level, surface and subsurface runoff, water balance, interception by trees and water running off from the stems, evapotranspiration and desiccation. The annual water balance of the soil, separately for each layer, is discussed on pp. 252-271. 30% of the precipitation is intercepted by the crowns, 5% lost by surface and 10% percolates to the ground water; 10% is evaporated or transpired by the grass cover and 30% transpired by trees. Detailed conclusions can be found on pp. 271-275. The extensive bibliography, with the exception of two papers, is limited to Russian works. *Subject Headings: 1. Soil moisture 2. Forest hydrology 3. Evapotranspiration 4. Velikie Luki Region, U.S.S.R.—A.A.*

10C-125

551.579.5

†Viehmeyer, F. J., **Soil moisture.** (In: *Handbuch der Pflanzenphysiologie*, Vol. 3, Berlin, Springer, 1956. p. 64-123. 9 figs., 8 tables, bibliog. p. 117-123.) DA (463.3 H192), DLC

(QK711.R83)—The author gives a comprehensive survey of the known research and literature pertaining to the subject of soil moisture, beginning with the pioneering achievements of BUCKINGHAM (1907) in the related field of energy changes. The terminology and classifications of soil moisture study are explained, together with the principal contributions of specialists in these related fields. The main topics covered are: 1) Classification of soil moisture; 2) Energy relations of soil moisture; 3) The field capacity and its measurement; 4) The permanent wilting percentage; 5) Soil moisture in relation to plant life; 6) Movement of soil moisture; 7) Root development and soil moisture. Appended is a comprehensive bibliography of the known literature on this subject. *Subject Heading: 1. Soil moisture research.—R.P.*

10C-126

551.508.79 551.579.5

Vilkner, Hans, *Über die Erdbodenfeuchtigkeit und ihre Messung mittels elektrischer Kapazität*. [On soil moisture and its measurement by electrical capacity.] *Zeitschrift für Meteorologie*, 11 (2):49-58, Feb. 1957. 10 figs., 2 tables, 46 refs. DLC—Soil moisture is defined as the amount of liquid and solid water, including the microfauna and flora and fine plant roots. The standard method of measurement is still drying bore samples at 105°C. Values range from 2-10% by weight in sand to 28-63½ in pure humus. Disadvantages of the bore method are set out and an alternative method is described using the dielectric constant of the material between the plates of a condenser. Wiring diagrams and test results are given. *Subject Headings: 1. Soil moisture 2. Soil moisture instruments.—C.E.P.B.*

10C-127

551.508.79:551.579.5

Visser, W. C., *Critische vergelijking tussen het gebruik van de lysimeter en van andere bepalmogelijkheden van de waterbalans*. [Critical comparison between the use of the lysimeter and of other possibilities to determine the water balance.] (In: Nederlandse Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek. Commissie voor Hydrologisch Onderzoek, *Verslagen Technische Bijeenkomsten*, 1-6, 1946-1950. Pub. 1952. p. 163-171. In Dutch. English summary p. 292-293; French summary p. 321-322.) DWB—Compares use of lysimeter with: 1) the hydrological method (determination of rainfall, discharge and filling of ditches); 2) salt content method (measurement of rainfall and of the salt content of soil, ditch and discharge water); 3) supply of water, controlling humidity attained; 4) measurement of soil moisture. No data is given. *Subject Headings: 1. Hydrologic cycle 2. Soil moisture measurement techniques.—A.A.*

10C-128

551.556:551.579.5

Vitvitskii, G. N., *Effektivnye mery oslableniia vrednogo deistviia sukhoveev*. [Effective measures for weakening the damaging effect of dry winds.] (In: Akademiia Nauk SSSR. Institut Geografii, *Sukhovei ikh proiskhozhdenie i bor'ba s nimi*. Moscow, 1957. p. 275-295. 2 figs., 19 tables, 28 refs.) DLC (QC940.R9A6)—Actual data, making it possible to judge to what extent forest-shelter belts and irrigation influence the increase of crop yield, are presented in numerous tables and two graphs. Author discusses separately the effect of forest belts on: 1) wind speed and the turbulence of air flow; 2) moisture content in soil and air; 3) air temperature; 4) evaporation, evaporability and transpiration. He shows that a reduction of turbulent exchange behind the shelter belts contributes to a greater moistening of the soil in the interbelt areas owing to a better distribution of snow cover and to the reduction of surface runoff. It also reduces evaporation which is of great importance for reducing the harmful effect of dry winds. *Subject Heading: 1. Shelter belt effects on soil moisture.—A.M.P.*

10C-129

551.579.5

Ware, Matti, *About soil humidity variations*. *I.U.G.G. Association of Scientific Hydrology, Oslo*, 1948, [Transactions], 3:286, [1950?]. DWB—Duration curves of percentage soil humidity for different depths derived on the basis of over 1000 profiles, made at Maasoja. *Subject Headings: 1. Soil moisture profiles 2. Maasoja, Finland.—A.A.*

10C-130

551.579.5 (673)

Welte, E., *Über Humuseigenschaften in Böden der wechselfeuchten Tropen*. [Properties of humus in soils of the intermittently humid tropics.] *Die Naturwissenschaften*, Berlin, 45 (11):274-275, June 1958. 2 figs., 6 refs. DLC—Research has been made on different soil samples of Portuguese Angola. Soils were from a climatic region with variable humidity (rain season from Oct. till April). Yearly mean temperature is about 20° and mean amount of rainfall 1500 mm. The author gives the values of Ph and the absorption capacities of the different considered soils. The amount of nitrogen in the Angola soil varies between 0.1 and 0.3%. With an increasing degree of humus, the carbon-nitrogen relation of the soil is increasing also. The importance of humus in the nitrogen supply for plants is shown. *Subject Headings: 1. Soil moisture 2. Nitrogen content in soil. 3. Tropical soils.—A.V.*

10C-131

551.579.5:63

Whitmore, J. S., Marais, J. N. and Turpin, H. W., **Weeds: major menace to crop production. Farming in South Africa**, 28(330):293-297, Sept. 1953. 3 figs., 4 tables. DWB—Weeds due to the competitive use of the limited available moisture, produce up to 40% of the total plant material, if not controlled. The crop of grain increased three times by control of weeds, over two times by heavy fertilization and, additionally, 2-5 times by moisture conservation. Distribution of rainfall and phenological data during the test are communicated. *Subject Headings*: 1. Crop yield 2. Soil moisture conservation 3. Union of South Africa.—A.A.

10C-132

551.579.5

Wieners, K. A., **Die Wasserverhältnisse von sieben verschiedenen Wiesenstandorten des mittleren Ahrtales im Verlauf eines Jahres.** [Water conditions of seven different meadow locations in the middle Ahr Valley in the course of a year.] *Zeitschrift für Acker- und Pflanzenbau*, 106(1):1-25, June 1958. 9 figs., 6 tables, 22 refs. English summary p. 23. DA (18 J825)—Comparative data are presented on ground water level, soil moisture content and other physical and chemical soil properties measured from May 1954 to June 1955 in closely located different grass land habitats. Weekly precipitation data are included. *Subject Headings*: 1. Soil moisture under grass 2. Ahr Valley, Germany.—G.T.

10C-133

551.508.79:551.579.5

Wohlrab, B. and Langner, Chr., **Zur Problematik einiger Bodenfeuchtebestimmungsmethoden.** [Investigation on methods of soil moisture determination.] *Zeitschrift für Acker- und Pflanzenbau*, Berlin, 105(3):283-288, March 1958. 2 figs., 2 tables, 14 refs. DLC—Description, commentary and directions for use of the Andersson-drill apparatus. Experiences have shown that this apparatus is best adjusted for measurements in the upper ground layers. *Subject Heading*: 1. Soil moisture instruments.—A.V.

10C-134

551.579.5

Woods, Frank W. (U. S. Forest Service, Marianna, Fla.), **Some effects of site preparation on soil moisture in sandhills of West Florida.** *Soil Science*, Baltimore, 85(3):148-155, March 1958. 3 figs., 3 tables, 19 refs. DLC—Soil moisture was found to be most important to survival of planted pine trees in Florida's sandhills. Soil moisture measurements were made thrice weekly for over 2 yrs on one natural and three specially prepared pine planting sites on the Chipola experimental Forest in W. Fla. sandhills. Daily rainfall and temp. records were taken, as were studies of drought days from May through August to show relationships between soil moisture and pine survival. In the Lakeland study area, the 3-9 in. soil depth was found more useful in relating soil moisture to seedling survival than any other depth. The only acceptable method for planting pines in deep sands are those which completely denude the site prior to planting. *Subject Headings*: 1. Soil moisture data 2. Weather effects on soil moisture 3. Chipola Exper. Forest, Fla.—R.P.

10C-135

551.579.5

Youngs, E. G., **Moisture profiles during vertical infiltration.** *Soil Science*, Baltimore, 84(4):283-290, Oct. 1957. 4 figs., 13 refs., 13 eqs. DLC—Theoretical moisture profiles calculated from the equation

$$\frac{\partial c}{\partial t} = \nabla \cdot D \nabla c + \rho g \frac{\partial K}{\partial z}$$

are compared with experimental profiles for two cases: a) vertical infiltration into initially dry columns of porous materials with the surfaces maintained at saturation; and b) the equilibrium condition of vertical infiltration at a constant rate into columns which drain to a water table. Good agreement is found between theory and experiment in both cases. *Subject Headings*: 1. Soil moisture during infiltration 2. Infiltration.—Author's summary.

10C-136

551.579.5

Youngs, E. G. (Agricultural Res. Council Unit of Soil Physics), **Redistribution of moisture in porous materials after infiltration.** *Soil Science*, Baltimore, 86(3):117-125, Sept. 1958. 5 figs., table, 20 refs., 11 eqs. DLC. Pt. 2, *Ibid.*, 86(4):202-207, Oct. 1958. 2 figs., 11 refs., 12 eqs. DLC—In Pt. 1, an attempt was made to explain qualitatively the experimental moisture profiles during the redistribution of moisture in inert homogeneous porous materials, after infiltration in the horizontal case, by considering the changing potential distribution in the porous body. In Pt. 2, moisture profiles during the redistribution after vertical infiltration to various depths into two inert porous materials were obtained, using an apparatus employing thermo-electric elements to estimate moisture content. By an extension of the analysis used in Pt. 1 for horizontal redistribution, the initial transition moisture content from the draining to the wetting zone was calculated from the

hydrological properties of the porous materials for various infiltration depths and compared with experimental values. This indicated that the redistribution of moisture would depend more critically on infiltration depth for porous materials with steep wetting moisture characteristics; that is, for materials with limited pore-size distributions. *Subject Heading: 1. Soil moisture variations due to infiltration.—R.P.*

10C-137

551.579.5:333.7

Zonn, S. V., *Materialy po izucheniiu vodnogo rezhima chernozemov pod lesnymi nasazhdeniiami*. [Data of a study of the water regime of chernozem soils under forest plantings.] *Akademiia Nauk SSSR Institut Lesa, Trudy*, 15:5-81, 1954. 19 figs., 30 tables, refs. DA (99.9 Akl)—Results of extensive soil moisture measurements made at the Derkul'sk research station in 1951 are presented in tables and graphs, showing the effect of forest cover and shelter belts upon soil moisture variations. *Subject Headings: 1. Soil moisture variations 2. Forest effects on soil moisture.—G.T.*

10C-138

551.579.5

[Unannotated list of supplementary references on soil moisture.]—This listing comprises material which could not be included in this Bibliography with full annotation and classification. Most of it is literature on soil moisture from the point of view of agriculture. All of the items referred to in this list may be found at the U. S. Department of Agriculture Library (but are only a small part of their holdings on the subject); the DA call numbers are given at the end of each entry.

(1) Agafonova, A. F., *Vodnyi rezhim i vodno-fizicheskie svoistva temno-kashtanovykh pochv pod snegozashchitnymi lesnasazhdeniiami*. [Water conditions and hydro-physical properties of the dark-chestnut soils under snow protecting forest plantings.] *Moscow. Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnogo Transporta, Trudy*, No. 129:64-80, 1957. 5 figs., 7 tables, 7 refs.—99.45 Z13

(2) Anna, M.; Oda, K. and Kibe, T., *Study on soil moisture measurement by electrical resistance method, Pt. 1. Kanto-Tosan, Japan. Agricultural Experiment Station, Journal*, 9:83-96, Sept. 1956. In Japanese; Engl. summary. UNCHECKED.—107.6 K83

(3) Astapov, S. V.; Bereshkovskii, P. M. and Zhukov, M. S., *O nekotorykh sposobakh nakopleniia vlagi v pochve*. [On certain ways in which moisture is accumulated in the soil.] *Akad. Nauk SSSR, Inst. Fizologii Rastenii im. K. A. Timiriyazeva, Sbornik Rabot*, No. 2:42-51, 1956. 12 tables, refs.—55 Akl

(4) Babcock, K. L. and Overstreet, R., *A note on the "Buckingham" equation. Soil Science*, 84(4):341-343, Oct. 1957. 7 refs., 6 eqs. (Vertical distribution of soil moisture).—56.8 So3

(5) Bakhtin, P. U., *K otsenke vodnogo rezhima pochv pri obychnoi ikh obrabotke i po sposobu T. S. Mal'tseva v 1955-1956 gg.* [On the estimation of water regime of soils under ordinary cultivation and by the Mal'tsev method in the years 1955-1956.] *Akademiia Nauk SSSR, Izvestiia, Ser. Biologicheskaya*, No. 4:431-444, July/Aug. 1957. fig., 7 tables.—511 S2B

(6) Beaucorps, G. de, *Contrôle électrique de l'humidité des sols. Premier aperçu sur les rapports entre l'eau et la forêt*. [Electrical measurement of soil moisture. Preliminary report on water-forest relations.] *Société des Sciences Naturelles et Physiques du Maroc, Section de Pédologie, Travaux*, 10/11:39-57, 1955/56. 9 figs. Engl. summary p. 57.—56.9 So36

(7) Beaucorps, G. de, *Evolution de l'humidité des sols dans une futaie claire de chêne-liège*. [Variations of soil moisture in a clear cork-oak forest.] *Annales de la Recherche Forestière au Maroc*, 4(1):87-103, 1956. 4 figs., plate, 2 tables. Engl. summary p. 102.—99.9 R11A

(8) Bierhuizen, J. F., *Some observations on the relation between transpiration and soil moisture. Netherlands Journal of Agricultural Science, Wageningen*, 6(2):94-98, May 1958. 2 figs., 12 refs. [Experiments involving transpiration measurements with kidney beans in pots with different soil moisture content.]—12 N3892

(9) Bloodworth, M. E. and Page, J. B., *Use of thermistors for the measurement of soil moisture and temperature. Soil Science Society of America, Proceedings*, 21(1):11-15, Jan./Feb. 1957. 5 figs., 22 refs.—56.9 So3

(10) Bollmeyer, K., *Bestimmung der Bodenfeuchte aus der Messung der Wärmeleitfähigkeit*. [Soil moisture determination from heat conductivity measurements.] *Zeitschrift für Pflanzenernährung, Düngung, Bodenkunde*, [Ser. A], 80(3):245-253, 1958. 3 figs., 19 refs.—384 Z343A

(11) Bolt, G. H., *De bepaling van het vochtgehalte en het volumegewicht van de bodem met behulp van neutronen en γ -stralen*. [The determination of moisture content and specific gravity of soils with the help of neutrons and gamma rays.] *Landbouwkundig Tijdschrift, The Hague*, 70(extra no.):282-286, May 1958. refs.—105.2 Or3

(12) Bruce, R. R. and Klute, A., *The measurement of soil moisture diffusivity. Soil Science Society of America, Proceedings*, 20:458-462, Oct. 1956. 3 figs., table, 9 refs., 8 eqs.—56.9 So3

(13) Carlo, G. del, *Sull'impiego di apparecchiature elettriche per la determinazione del contenuto in acqua del suolo*. [The use of electric apparatus for soil moisture determination.] *Flor-*

- ence. *Istituto Sperimentale per lo Studio e la Difesa del Suolo, Annali*, 2(17), 1955, pub. 1956. 36 p. figs., tables, 10 refs.—56.9 F66
- (14) Carlson, C. A. and Reinhart, K. G., Predicting moisture in the surface foot of the soil. *Soil Science Society of America, Proceedings*, 20:412–415, July 1956. 3 figs., 2 tables, 4 refs.—56.9 So3
- (15) Cavazza, Dominizio, La determinazione dell'umidità contenuta nel terreno. [The determination of soil moisture; we present a new method.] *L'Italia Agricola*, Piacenza, 95(6):314–320, June 1958. 6 figs., refs.—16 It1
- (16) Chandnani, J. J.; Gandhi, R. T.; Gupta, M. M. and Bodale, V. N., Tensiometer as an indicator of moisture status in soil. *Indian Journal of Agronomy*, 2(3):137–141, March 1958. UNCHECKED.—22 In235
- (17) Dolgov, S. I., Osnovnye zakonomernosti povedeniia pochvennoi vlagi i ikh znachenie v zhizni rastenii. [Basic laws governing the behavior of soil moisture and their significance for plant life.] (In: *Vsesoiuznoe Soveshchanie po Prob. "Biologicheskie Osnovy Oroshaemogo Zemledeliia," Sbornik Statei*, 1955, pub. 1957. p. 635–652. 10 figs., 2 tables, refs.—55.9 V96
- (18) Draganov, D., Vodniam rezhim na chernozem-smolnitsata i kanelenata gorska pochva. [Moisture regime of Smolnitsa-chernozem and brown forest soil.] *Bulgaria. Ministerstvo na Zemedelieto i Gorite, Nauchni Trudove, Ser. Rastenievudstvo*, 2(6):41–48, 1957. 4 figs., 3 tables. Russian and Engl. summaries.—64.8 N22
- (19) Eggert, R., The effect of cover crop management on soil moisture in a young apple orchard. *American Society for Horticultural Science, Proceedings*, 70:21–26, Dec. 1957. UNCHECKED.—81 So12
- (20) Endriga, B. G., An evaluation of electrical resistance blocks in measuring soil moisture. *Soil Science Society of the Philippines, Journal*, 8(3rd Quarter):140–149, 1956. figs., 3 plates, 3 tables, 11 refs.—56.9 So35 Also published in: *Philippine Journal of Soil Conservation*, 2(1/2):14–19 1957.—56.8 P53
- (21) Fedorovskii, D. V., Nekotorye vodno-fizicheskie svoistva i struktura moshchnykh chernozemov Kurskoj zonal'noj opytно-meliorativnoj stantsii i ikh izmenenie pri oroshenii. [Some hydro-physical properties and structure of heavy chernozems belonging to the Kursk Zonal Reclamation Station and their modification as affected by irrigation.] *Akademiia Nauk SSSR. Pochvennyi Institut, Trudy*, 50:132–151, 1957. fig., 19 tables, refs.—56.9 P44
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SUPPLEMENTARY MATERIAL

10C-139

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†Budagovskii, A. I., **Vpityvanie vody v pochvy.** [Absorption of water by soils.] Moscow, Akademiia Nauk, Institut Geografii, 1955. 136 p. 24 figs., tables, 68 refs., 90 eqs. **DLC** (S594.B93) —A technical monograph presenting theory and practical data on laboratory and field work on infiltration, the hydrologic cycle, movement of water in soil and subsoil, effect of soil, humidity and temperature on infiltration, changes with depth, capillary effects, runoff, irrigation, etc. *Subject Headings: 1. Infiltration 2. Soil moisture.*—M.R.

10C-140

551.501:551.579.5

Heigel, K. (*Met. Observatorium, Hohenpeissenberg*), **Ergebnisse von Bodenfeuchtemessungen mit Gipsscheibenelektroden.** [Results of soil moisture measurements with gypsum plate electrodes.] *Meteorologische Rundschau*, Berlin, 11(3):92-96, May/June 1958. 6 figs., 2 tables, 4 refs. **DWB, DLC**—The principle of conductivity measurement with the aid of gypsum plates developed by M. KÖHN was used to measure continuously the soil moisture on different exposures and on different soils. The calibration of the gypsum plate and the temperature correction are outlined with the aid of tables giving moisture values in per cent of dry soil (resistance in kilo-ohm, calibration in humus soil for 15°C) and temperature correction for reduction of measured resistance to 15°C. Measurements were made upon a north or south 20° slope, at soil depths of 5 to 50 cm in humus and clay soil during 1952, 1953 and 1955. The moisture differences at different depths of the same locality and at the same depth but at different exposures showed considerable variations during the rainy summer of 1953, which are attributed to the percolation of soil water to deeper levels. The results of measurements are presented by means of graphs giving soil moisture in per cent weight (referred to weight) as a function of resistance in ohms, soil moisture of various depths, etc. *Subject Headings: 1. Soil moisture measurement techniques 2. Soil heat conductivity.*—I.L.D.

10C-141

551.579.5:551.501.45

*Pfau, Rolf, **Statistische Bearbeitung von Bodenfeuchtigkeitswerten.** [Statistical analysis of soil moisture data.] Germany. *Deutscher Wetterdienst, Berichte*, 7(46), 1958. 20 p. 8 figs., 11 tables, 16 refs., eqs. German and English summaries p. 3. **DLC**—It is shown by means of statistical criteria that the frequency distribution of soil moisture data cannot be represented as a normal distribution, but has to be considered as a mixed distribution. By means of the analysis method of O. ESSENWANGER the mixed distribution is divided into subcollectives (Teilkollektive). For the agrometeorological offices at Geisenheim and Heidelberg each frequency curve comprises two principal sub-collectives, the statistics, standard deviation and mean value of which are defined. It can be shown that the formally obtained values permit one to define objectively the field capacity, the pseudo field capacity, the maximum soil moisture contents available and the evaporation space (Verdunstungsraum) of the plot for soil moisture measuring purposes so that they are in conformity

with previous ideas for the most part formed on an empirical basis. *Subject Heading: 1. Soil moisture data analysis.*—*Author's abstract.*

10C-142

551.501:551.579.5

Rettig, Helmut, *Darstellung und Verwertung von Ergebnissen der Bodenfeuchtigkeitsmessungen bei der agrarmeteorologischen Versuchs- und Beratungsstelle Neustadt an der Weinstrasse des deutschen Wetterdienstes.* [Representation and evaluation of results of soil moisture measurements at the agrometeorological research and information center of the German Weather Service at Neustadt an der Weinstrasse.] *Meteorologische Rundschau*, Berlin, 11(2):47-51, March/April 1958. 4 figs., 4 tables, 8 refs. **DWB, DLC**—The moisture content of soil in the first 100 cm is determined by the summation of the water content in millimeters at intervals of W_{0-20} , W_{20-60} and W_{60-100} . And by means of soil moisture values in volume percent and the water content in millimeters the following representation possibilities are available: curve of soil moisture in percent volume which enables the comparison of soil moisture content in individual soil layers on different days and to show the daily variation of soil moisture as compared with that of temperature; for example: isopleth representation of soil moisture in percent volume indicating variation of soil moisture over longer periods; and columnar representation in millimeters, whereby water infiltration at various depths can be determined. In order to determine the extent to which the soil water content is removed from saturation condition of the soil and how much water the soil gives to plants there was established a relative quantity consisting of the maximum and minimum water content of the soil, that is the range between exhausted maximum water content of soil during saturation and the minimum possible water content. The determination of relative soil moisture, which is the water content value measured on successive days, expressed in percent of maximum exhaustible water content, is described, and its application to an analysis of soil moisture conditions at Neustadt is illustrated. *Subject Headings: 1. Soil moisture data analysis 2. Neustadt, Germany.*—*I.L.D.*

10C-143

551.508.72

551.508.79:551.579.5

551.508.71

†World Meteorological Organization. Commission for Instruments and Methods of Observation, *Measurements of evaporation, humidity in the biosphere and soil moisture.* Report of a Working Group . . . prepared by N. E. Rider, chairman. *World Meteorological Organization, Technical Note*, No. 21; WMO (Pub.) No. 72. Tp. 28, 1958. 49 p. table, 135 refs. French, Russian and Spanish summaries. **DWB, DLC**—The substance of the report on the measurement of soil moisture and related studies is presented under joint authorship of the Working Group set up by the president of the Commission for Instruments and Methods of Observation, in accordance with recommendations made previously (CIMO-I and CAgM-I). A comprehensive summary of the available information on soil moisture measurement is given detailed treatment, with particular attention to the suitability of the instruments available for (a) the continuous recording of soil moisture, (b) the measurement of real evaporation and evapotranspiration, and (c) the measurement of the humidity content of the biosphere. A selected bibliography illustrating the main lines of theory and research in the particular fields is included. *Subject Headings: 1. Soil moisture measurement techniques 2. Evaporation measurement techniques 2. Humidity measurement techniques.* I. Rider, N. E.—*R.P.*

PART III. REVIEWS, TRANSLATIONS, RECENT MONOGRAPHS, AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of *Meteorological Abstracts and Bibliography*.

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

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- Higgins, J. J.: *Your T.V. weather map*. Glasgow, Blackie and Son, 1958. 90 p. Review in *Royal Meteorological Society, Quarterly Journal*, 84(362):481, Oct. 1958.
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- Petterssen, S. et al.: *Cloud and weather modification: a group of field experiments*. *Meteorological Monographs* (American Meteorological Society), Boston, 2(11), 1957. 111 p. Review in *Geofisica Pura e Applicata*, 39:238, 1958.
- Redfield, A. C. et al.: *Interaction of sea and atmosphere*. *Meteorological Monographs* (American Meteorological Society), Boston, 2(10), 1957. 75 p. Review in *Geofisica Pura e Applicata*, 39:238, 1958.

B. TRANSLATIONS AND RECENT MONOGRAPHS

TRANSLATIONS

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- Berliand, Mark Evseevich: *Forecasting and controlling the heat regime of the atmospheric layer near the ground*. (Transl. of the original Russian, Predskazanie i regulirovanie teplovogo rezhima prizemnogo sloia atmosfery, issued Leningrad, Gidrometeoizdat, 1956. 434 p. figs., tables, refs., eqs. Original available DLC.) Transl. by Irene Donehoo of table of contents, tables, and figure captions (16 p. typescript), available DWB (M24 B514pE). (See 8.8-9, Aug. 1957, MAB)
- Dinkelacker, Otto: *Distribution function of the wind velocity over the Hochrhön*. (Transl. of original German, Verteilungsfunktion der Windgeschwindigkeit für die Hochrhön, in *Wetter und Klima*, No. 9/10:257-270, 1958.) Transl. issued by Sandia Corporation, Albuquerque N. M., available DWB (M52 D5844di)

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- ubrovin, V.: **Observation of artificial earth-satellite signals.** (Transl. of original Russian, *Nabliudenie za signalami iskusstvennykh sputnikov zemli*, in *Radio*, No. 8:19-20, 1957. figs.) Transl. by David Kraus and John Miller issued by American Meteorological Society under Contract AF 19(604)-1936, Oct. 1957. 5 p.
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RECENT MONOGRAPHS

- aina. Central Bureau of Meteorology: **First steps in research for extended range forecasting of rainfall in summer in Eastern China.** Issued Peking, Dec. 1956. 72 p. In Chinese. Available DWB (M09.33 C539wo)
- efant, Albert and Defant, Friedrich: **Physikalische Dynamik der Atmosphäre** [Physical dynamics of the atmosphere]. Frankfurt a.M., Akademische Verlagsgesellschaft, 1958. 527 p. figs., tables, bibliogs., eqs.
- ck, Bruno: **Technische Strömungslehre** [Technical flow theory]. 5th ed. Berlin, Springer, 1957. 422 p. figs., refs., eqs.
- chenberger, Willy: **Flugwetterkunde: ein umfassender Lehrgang** [Aviation meteorology: a comprehensive curriculum]. Zürich, Schweizer Druck- und Verlagshaus AG, 1958. 334 p. plates, figs.
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- gyay, Victor and Olgyay, Aladar: **Solar control and shading devices.** Princeton Univ. Press, 1957. 201 p. figs., refs.
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C. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

cta *Geophysica Polonica*, Warsaw, Vol. 6, No. 3, 1958

- Liszka, Ludwik: **Some remarks about the results of the observations of the [01]-5577 nightglow at Sacramento Peak in 1955,** p. 197-204
- Teisseyre, Roman: **The general problem of a conducting wedge,** p. 205-221
- Drpste, Zofia and Gibowicz, Sławomir: **Determination of the magnitude of distant earthquakes at the Silesian Geophysical Station in Racibórz,** p. 222-235
- Słomka, Jan: **Distribution of radiation of wave length 0.5μ over a sky covered by a thick cloud layer (provisional communication),** p. 236-242
- Adamczewski, Ignacy: **O zanieczyszczeniach promieniotwórczych naturalnych i sztucznych powietrza i wody,** [Study of the radio-active contamination, natural and artificial, of air and water], p. 243-259

- Teisseyre, Roman: Note on relationship between focus dimensions and earthquake magnitude p. 260-261
- Kosiłowa, Stefania: Visual observations of aurorae in Poland in 1957, p. 262-263
- Bóbr-Modrakowa, I. and Teisseyre, Roman: IV Konferencja Europejskiej Komisji Sejsmologicznej Międzynarodowej Asocjacji Sejsmologii i Fizyki Wnętrza Ziemi w Utrechcie (1958 R.), [The Fourth European Conference of the Seismological Commission, International Association of Seismology and the Physics of the Interior of the Earth, Utrecht 1958], p. 264-267
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